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REPORT

1984-1985

Alberta
ENVIRONMENT

Alberta
ENVIRONMENT

Office of the Minister

132 Legislature Building, Edmonton, Alberta, Canada T5K 2B6 403/427-2391

The Honourable David J. Carter
Office of the Speaker
Legislative Assembly of Alberta

Sir:

I have the honour to hereby transmit the Annual Report of the Department of the Environment for the year ended March 31, 1985.

Respectfully submitted,

Ken Kowalski

Ken Kowalski
Minister of the Environment

Alberta
ENVIRONMENT

Office of the Deputy Minister

14th Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, Canada T5K 2J6 403/427-6236

November 14, 1986

Honourable Ken Kowalski
Minister of Environment

Sir:

I have the honour to present the fifteenth Annual Report of Alberta Environment, which covers the fiscal year ending March 31, 1985.

Respectfully submitted,

Walter Sołodzuk, P. Eng.
Deputy Minister

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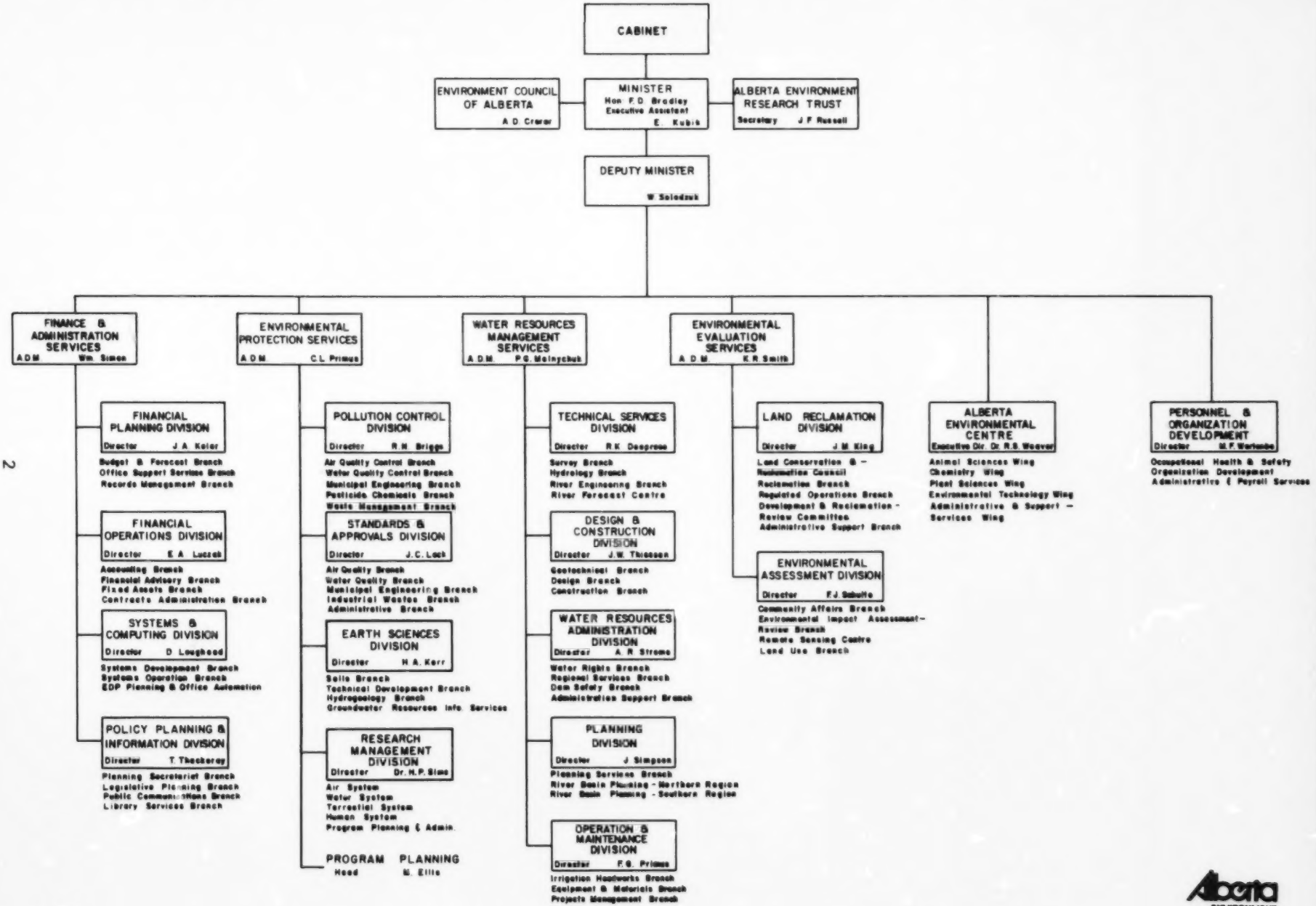

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Alberta ENVIRONMENT

MARCH, 1985

OFFICE OF THE DEPUTY MINISTER

Walter Solodzuk, P.Eng.
Deputy Minister

Sherman Weaver, Ph.D.
Director
Alberta Environmental Centre

Morgan Wartenbe
Director
Personnel and Organization Development

ALBERTA ENVIRONMENTAL CENTRE

The Alberta Environmental Centre in Vegreville provided environmental research, services and technology development to several Alberta Government departments and agencies. Major clients were the Departments of Environment, Agriculture, Energy and Natural Resources, Workers' Health, Safety and Compensation, the Alberta Research Council, and public health units.

Work proceeded in 45 programs and over 120 projects in areas identified by client agencies. All work was requested by a client and was reviewed and approved by the Technical Advisory Committee (consisting of senior staff from client departments), and the Board of Directors (comprised of deputy ministers or designates from client departments). Representatives of two additional departments - Social Services and Community Health and Economic Development - were appointed to the Board.

Demand for services such as analytical and diagnostic work continued near or above capacity. Demand for drinking water tests exceeded laboratory capacity, necessitating the establishment of quotas. When user departments or agencies had a demand in excess of the quota, tests were done by laboratories in the private sector. In other cases such as the radiocarbon dating and tritium analysis laboratory, a significant increase was recorded in the number of samples analyzed. Some services such as microbiological identification were provided for the first time to external clients.

Research produced significant results from on-going studies as well as from new scientific initiatives. For example, results were being written up following a multi-year study of the effect of logging on wildlife. Several years of work on chemical residues in fish was completed and emphasis shifted to specific aquatic problems.

Among new studies started was one to select and breed native grasses for the revegetation of disturbed lands. The Centre was also selected as the focus of a national program of research on humane trapping.

Several initiatives were undertaken in development of technology in the areas of emission control, waste incineration, waste stabilization and water treatment.

Construction was completed on western Canada's first inhalation toxicology laboratory. A mobile water treatment laboratory was acquired, giving the Centre the capability of on-site assessment of water treatment needs of communities throughout the province.

Centre work is divided into eight Program areas:

Land Resources Management Research and Development

Collections were made of native plants for reclaiming disturbed lands. Plants were collected on the Eastern Slopes and four species were transplanted to the Centre for intensive study. Elsewhere, shrubs were collected for oil sands mine reclamation studies.

Soil studies investigated constraints on land reclamation and ways of restoring land productivity. The focus was on reclamation and ways of restoring land productivity. The focus was on reclamation of highly sodic materials exposed during resource development. Sodic soil materials were used in trials which attempted to control soil compaction.

An experiment was started on using plants to control soil salinity due to excess hydrological recharge.

Another study investigated methods of drying tailings sand-sludge mixes remaining after bitumen extraction.

Water/Wastewater Management Research and Development

Distribution and concentration of chemical residues in fish and birds were studied. Initial study of mercury residues concentrated on fish. Follow-up studies were begun on whether mercury in fish from southern Alberta rivers originates from geological sources.

Long-term monitoring of chemical residues in colonial nesting birds and in the prey of peregrine falcons was started.

Potential methods of removing color, taste and odor from pulp mill effluent were investigated. Chlorination and fungi were studied for effluent color removal, and promising fungal species were selected for further study.

Technology to remove iron from well water was investigated and sewage lagoon modelling studies were undertaken.

Waste Management Research and Development

Emission control studies focussed on sulphur dioxide removal from industrial waste gases. A sulphur dioxide removal process was successfully tested in the laboratory and at a natural gas processing plant, providing efficient sulphur extraction and a potentially marketable by-product.

Chemical and physical tests were conducted to assess solidification processes and establish guidelines for handling solidified wastes.

Approval was granted to design and construct a building for a pilot-scale incinerator. Research priority was given to disposal of industrial and hospital wastes.

Surveys of cattle feedlots were conducted to determine the effect of feedlot wastes on nearby surface waters.

Short-term microbial tests were developed and evaluated for testing of environmental samples. These tests were offered as a support service. Research continued on bacteria which are tolerant to the uptake of one form of chromium from waste streams.

Living Natural Resources

A Dickson Dam reservoir ecological study was launched. Fish were collected to monitor native and stocked fish populations to allow prediction of aquatic events and trends in reservoirs.

Data analysis progressed on population biology, home range area and food habits of grizzly and black bears captured and radio-collared in the Berland River Timber Management Area. Studies were completed on using satellites to map vegetation cover and monitor changes in land use and road access in this area.

Alberta and the Fur Institute of Canada agreed to undertake a five-year humane trapping research program.

Several studies were undertaken on control techniques for problem wildlife such as coyotes.

A pilot project was started to provide information on intensive big game management, including game ranching of elk and bison.

Pest Management Research and Development

Field and laboratory experiments were conducted on herbicides, weed biology and use of insects and diseases for weed control. Herbicide studies included crop tolerance to herbicides, effect of environment on herbicide performance and control of volunteer crops, and behaviour of herbicides in soil. Weed-crop competition studies dealt with broad-leaved and grassy weeds in wheat, barley and canola, and mathematical models were developed to predict barley and wheat yield losses due to wild oats and tartary buckwheat. In biological control studies, predator insects were released on leafy spurge and perennial sow thistle near Cardston and other sites.

Research was conducted on insect pests of livestock, field crops, ornamental and horticultural crops, to determine the damage caused by the pests. Experiments were conducted on the effect of flea beetle and root maggot damage on canola, and to improve methods of detecting, assessing and forecasting pest populations. Biological control was tested for mites, whiteflies and mealybugs in greenhouses, and house flies in poultry barns. Chemicals were studied to control chrysanthemum leaf miners, mites, thrips and whiteflies in greenhouses and horn flies and black flies on cattle.

Plant disease trials were conducted on chemical control of seedling blight and sclerotinia stem rot of canola and lentils, glume blotch of wheat and net blotch of barley. Further studies examined the effect of herbicides on development of wheat and barley diseases. Trials on 'alfalfa decline' included monitoring the response of the crop to different sulphur levels and inoculating field plots with three fungi suspected to be associated with the disorder. Biological control of root-knot nematodes in greenhouses was studied. Surveys of canola revealed that the incidence of the destructive strain of blackleg of canola has increased from 1983 (when it was first detected) in north-central Alberta.

Pesticide analysis services were provided such as drinking water testing for Health Units, and water sample analyses for Alberta Environment.

Pesticide analyses were carried out to support the Athabasca River black fly project, the provincial pesticide container collection project and other projects. Herbicide residues in soils, plants and water were analyzed as part of the Centre's chemical damage investigation service.

Environmental Toxicology

Inhalation toxicology laboratory construction was completed and commissioning began. The facility was designed to contain and manage gases and other airborne materials with initial emphasis on long-term, low-level hydrogen sulphide exposures. Studies were completed to provide baseline data for inhalation experiments, including the development of methods for assessing the effects of inhaled compounds.

Work on the effects of environmental sulphur on livestock included studies of cattle health problems near sour gas processing plants. A report on the effect of the Lodgepole gas well blowout on livestock was presented to an Energy Resources Conservation Board inquiry panel.

Studies were started on chemicals which may enter the Athabasca River system by natural seepage or leaching or by oil sands extraction activity. Analytical methods were developed for 10 hydrocarbons and used to test fish tissues. Development of analytical methods for 10 more hydrocarbons was started.

In response to a problem encountered by Alberta Agriculture, the biological effects of a pour-on insecticide on cattle was investigated.

Analytical, Diagnostic, Extension and Technical Services

Most Centre services were offered in this Program Area.

Some 13,630 drinking water samples were tested, mainly for provincial Health Units and Alberta Environment. A quota system was implemented to ensure accurate and timely test results. A further 600 water samples were analyzed for a water quality survey in selected Alberta river basins.

Over 7,800 tests were performed for Alberta Environment on ambient air and on gases from industrial smoke stacks. Emissions from 18 industrial plants were analyzed.

Some 277 electron microscope studies were conducted including identification of viruses, pollen grains, asbestos fibres, and studies on fish gills and other materials. Tissue collected by University of Alberta investigators from one of the crewmen in the Franklin expedition (1845) was also examined.

Radiocarbon dating and tritium analyses were provided for projects ranging from dryland salinity to archaeological excavation.

Wildlife and aquatic biology services included industrial toxicity tests; advice in using a net gun to capture large animals; and operation of a recycling water treatment system for fish tanks.

Insect, plant disease and weed identifications held steady with 634; 1,392 and 350 submissions respectively. A total of 485 submissions, involving 1,150 specimens, was processed for the chemical damage investigation service.

Investigations into alleged livestock health problems near natural gas processing plants were conducted. There was also an investigation on potential problems with fungal toxins in unharvested over-wintered grain crops in the Peace River region.

Other services were offered in soil analysis, microbiological identification, quality assurance and control, instrument repair and calibration, animal pathology and computer science.

Administration and Technical Support

Administration and technical support services included library, personnel, financial, communications, site support and electronic data processing operations.

Library operations included manual and computer-assisted reference searches, collection development and related activities.

Personnel services were provided in areas such as recruitment, and staff relations and training. The new occupational health program also provided services such as first aid courses.

Financial services duties included preparing budget documents and monitoring the budget expenditures. Progress was recorded in the purchase and installation of an office automation word processing system.

Communications activities included production of an annual review, publication distribution, news media liaison, tours, and an Open House.

Staff co-ordinated activities of the 750-acre (300-hectare) site, assigning, developing and preparing areas for research and facilities.

A laboratory information management system was being developed to collect and analyze information generated in Centre laboratories.

PERSONNEL AND ORGANIZATION DEVELOPMENT DIVISION

The Personnel and Organization Development Division recruits and provides training and developmental opportunities for staff, is responsible for the occupational health and safety and job evaluation programs and provides services within the department in the areas of payroll and contract administration, employee/employer relations and performance appraisal/evaluation.

The division has four branches: Administrative and Payroll Services, Personnel Services, Organization Development and Occupational Health and Safety.

Administrative and Payroll Services Branch

This branch provides the division's administrative services and is responsible for payroll functions for the department. As of March 31, 1985, the department had 1,160 salaried positions, with more than half located in Edmonton and the remainder in field offices throughout the province. Major field offices are located in Vegreville, Lethbridge, Calgary, Grande Prairie, Peace River and Red Deer.

During 1984-85, 47 salaried and 878 wage employees commenced work with the department, 99 salaried and 750 wage employees terminated their employment and 13 employees were transferred to other provincial government departments.

Personnel Services Branch

This branch provides a broad range of personnel services including recruitment, classification, employee relations, organization analysis and employee counselling.

The branch conducted 86 competitions, an increase of 41 percent from the previous year's total of 61.

Through the process of an executive committee review, a number of vacant positions were reallocated within the department and 21 permanent vacant positions were abolished.

Organizational changes and regular updating of position descriptions resulted in the reclassification of 195 positions, a slight reduction from 204 during the previous year.

Other services provided included employee relations matters, employee counselling, exit interviews and organization review and analysis.

Organization Development Branch

This branch administers programs to enhance organization and human resource development so that it will be consistent with the achievement of departmental goals.

Emphasis continued to be placed on the internal delivery of training experiences in Edmonton and other locations throughout the province. Several programs were offered at the Alberta Environmental Centre in Vegreville.

Again this year, one of the most significant courses offered internally was the Zenger-Miller Supervision program. The department is licensed to deliver this program and four personnel administrators, as well as the branch manager, are certified trainers. The program is designed to develop incident specific supervisory skills to prepare supervisors for a broad range of supervisor-employee situations. One of the features of the program is the management support skills component which provides participants' managers with techniques to reinforce their supervisors' newly acquired skills. The evaluations of this program have been very positive.

Other internal programs such as familiarization, stress management, the selection process and performance appraisal continued to be offered on a regular basis throughout the year.

There has also been a continued involvement in a broad range of external courses, primarily those offered by the Organization Development Division of the Personnel Administration Office. Educational leave continues to be effectively curtailed.

Occupational Health and Safety Branch

This branch co-ordinates the department's occupational health, safety and hygiene programs, provides a professional consultation service to staff and is the main contact with Worker's Health Safety and Compensation and the Occupational Health and Safety Branch of the Personnel Administration Office.

Emphasis was placed on safety training and awareness programs, with special attention given to temporary staff. During the year the branch began a safety orientation for new employees. More than 200 employees took seminars on amended health and safety regulations.

The branch manager participated on committees for vehicle safety, safety training and statistics and the division director was invited to sit on the government/union occupational health and safety committee.

FINANCE AND ADMINISTRATION SERVICES

William Simon, RIA
Assistant Deputy Minister

J.A. Kolar
Director
Financial Planning Division

E.A. Luczak
Director
Financial Operations Division

Dave Lougheed
Director
Systems and Computing Division

Tom Thackeray
Director
Legislative Planning & Media Information Division

Finance and Administration Services provide administrative and support services to the department in financial planning, financial operations, systems and computing, legislative planning, media and information and contract administration.

The Assistant Deputy Minister of Finance and Administration Services is the senior financial officer of the department and is responsible for administering the Financial Administration Act. This involves establishing a system of efficient internal control, developing a code of accounts to satisfy both central agency and departmental requirements, satisfying financial reporting needs of departmental requirements, satisfying financial reporting needs of departmental personnel and advising financial expenditure officers on monitoring and control of expenditures.

FINANCIAL PLANNING DIVISION

The Financial Planning Division coordinates the budgetary process, records management, mail, courier and duplicating services.

Budget and Forecast Branch

The branch compiled the 1985-86 Alberta Heritage Savings and Trust Fund departmental budget of $63,960,000 and the 1985-86 general revenue budget of $89,187,603. The branch also co-ordinates the Public Works, Supply and Services budget submission for capital construction and accommodation.

The branch monitored the 1984-85 departmental general revenue and Alberta Heritage Savings and Trust Fund budgets and co-ordinated several government employment programs as well as managing departmental space needs and insurance matters.

Records Management Branch

The branch develops, co-ordinates and evaluates the department's records management program.

Retention periods and final dispositions were established for all administrative records and a departmental records management policy and procedures were drafted. Some 243 participants took part in 17 in-house records management courses.

Forty-four cubic meters of record material was transferred for storage and/or destroyed - an increase of six cubic meters over last year's total.

The branch assisted many areas of the department with records systems design, operation, maintenance, equipment and supplies.

Office Support Services Branch

Among the services provided by this branch are central duplicating, courier and mail systems, building maintenance and security, telecommunications and furniture, photocopying, microfilming, diazo and other related areas.

The above services are provided through a central office in Edmonton and regional offices in Lethbridge, Red Deer, Grande Prairie, Peace River, Calgary and Fort Chipewyan.

The branch mailroom processed 3,827 bags and 914 boxes of external mail and the courier carried 799 special pickups and deliveries.

The duplicating operation processed 5,154,482 copies, 37,068 square meter (101,542 prints) of diazo printing, and bound 20,289 books and reports.

FINANCIAL OPERATIONS DIVISION

The division provides accounting and financial services to the department. The division is responsible for the development and implementation of policies, procedures and financial systems required to ensure effective financial management. Support is provided to senior management in the areas of expenditure and revenue accounting, fixed asset control, financial systems development, financial consulting and internal systems review services to assist in the attainment of program objectives.

The division has three branches: Accounting, Financial Advisory and Fixed Assets.

Accounting Branch

The Branch develops, implements and maintains departmental accounting and financial reporting systems to ensure operational procedures are in accordance with the Financial Administration Act and other related government policies and procedures. Responsibilities include payment of all vendor accounts; recording and reporting of department liabilities, revenues and expenses and collection of outstanding accounts receivable. In December, 1984, the branch assumed responsibility for the payment of contracts and operation of the contract registry system.

Financial Advisory Branch

The branch provides advisory services to other divisions for the improvement of financial and administrative systems. The branch also conducts internal financial reviews and liaises with the Office of the Auditor General and Alberta Treasury to ensure that sound internal control procedures are implemented within the department.

Fixed Assets Branch

The branch maintains an automated system to control the department's fixed assets and ensure that they are used efficiently. A program of cyclical physical verification of department assets is in progress.

Contract Administration Division

The division is responsible for developing, implementing and administering policies and procedures relative to the preparation and approval of contracts and agreements. Consultative services are provided to departmental staff regarding negotiation, development and preparation of contracts and agreements.

Table 1 shows the number and value of new contracts approved.

Table 1

Year	Number	Value
1980-81	932	$300.0 million
1981-82	1,092	281.8 million
1982-83	1,175	207.7 million
1983-84	913	67.3 million
1984-85	849	48.4 million

In addition to the 849 new contracts, 340 contractual agreements were in effect from previous years, for a total of 1,189 active contracts administered during the year.

A new computerized contract registry system has enabled the division to provide the department with increased service and information.

The division is represented on the Public Works Act Inter-Departmental Committee established by the Minister of Public Works to make recommendations on legislation and contract administration procedure relative to security bonds and third-party claims.

SYSTEMS AND COMPUTING DIVISION

The division supports all departmental programs by planning, developing, operating and maintaining computer programs and systems. The division also provides computing facilities and trains departmental staff to use equipment and computer programs.

EDP Planning and Office Automation Branch

The branch develops computer system plans, prepares the departmental electronic data processing plans and conducts feasibility studies concerning computer systems. The branch also develops and implements the computer-based systems used for word processing, electronic mail and electronic filing.

Systems Development Branch

The branch manages all phases of large and medium scale computer systems development and enhancement including developing detailed requirements, designing, programming and implementation. The branch provides technical support in the areas of telecommunications, contracts for new systems development, consultants and equipment.

Systems Operations Branch

The branch keeps operational systems up-to-date, develops small-scale projects, enhances and maintains all general-use equipment as needed and provides a consulting service to staff on operational problems.

Current systems: More than 20 data systems and 40 scientific computer programs are maintained. The systems include data on air quality, water quality, hydrometric and climatological conditions and groundwater. The data is used in the Department's monitoring, assessment and regulatory activities. A mini-computer routinely collects data on water levels, precipitation and water quality.

A number of technical/engineering computer programs simulate various hydraulic, hydrometric and atmospheric phenomena. They are used by staff to delineate river floodplains, forecast river flows and predict pollutant concentrations.

Computer programs for statistical analyses, graphs and tabulating data are maintained to help technical staff assemble reports.

Word processing and spreadsheet programs are widely used in the department to prepare administrative information. The branch maintains several other specialized non-scientific systems including a contract registry, groundwater well and water resource administration systems.

Projects completed: A materials testing system was installed to help test and analyze construction materials. The department's image analysis system was improved to allow more work to be processed. Several components of the department's water-use system including oil and gas and industrial water use areas were completed.

A new computerized control system for monitoring water quality was developed and tested. A large number of work stations were acquired and installed to improve word processing and administrative tasks.

To simplify and speed up translating water elevation chart into a computer readable form, the department's digitizer system was enhanced. Other statistical and reporting improvements were made to the department's data acquisition system.

Co-ordination and planning: The department and Environment Canada exchanged data and systems technology. These exchanges involved water quality, air-monitoring and hydrometric data. The department has access to Canada Land Inventory data, indexes of satellite and air photo imagery, data about municipal water and wastewater treatment facilities and information about special wastes.

LEGISLATIVE PLANNING AND MEDIA INFORMATION DIVISION

During 1984-85, the Environmental Education, Communications and Library Services branches were combined with Legislative Planning to form a new division which reports to the Assistant Deputy Minister, Finance and Administration Services.

Amendments to the Water Resources Act, the Hazardous Chemicals Act and the Special Waste Management Corporation Act were drafted and passed during the fall sitting of the Legislative Assembly.

Environmental Education Branch

The branch manages educational programs, supports teachers, youth and service group leaders and advises the department, other governmental agencies and professional organizations on environmental education.

In 1984-85, the branch:

- completed three draft units of the solid waste environmental education program;
- continued the water quality monitoring education program with 40 high school biology teachers and more than 4,000 high-school students in 10 Alberta communities;
- completed more than 60 teacher/leader workshops and in-service units with more than 700 teachers and leaders contacted;
- provided consultation for more than 100 community and government organizations;
- developed the Alberta environmental education network to help communications and information sharing among interest groups, and
- began a market planning process for environmental education service.

Public Communications Branch

The branch provides media relations and communications production services to the department.

The branch published six issues of the magazine **Environment Views,** examining the environmental movement, river basin planning, research, forestry and sour gas. Free subscriptions to the magazine increased bringing the total circulation to around 12,000.

A number of activities were organized for National Environment Week, June 3 to 9: displays in Calgary and Edmonton shopping malls, an open house at the Alberta Environmental Centre, media interviews, speaking engagements and car exhaust testing clinics.

The department, and environmental issues in general, attracted a great deal of media attention. Some 58 news releases were issued and the office took on the responsibility for handling media calls to the department.

Two public affairs officers and a production assistant in the Edmonton office handled about 255 orders for print materials, photography, advertising, displays, signage and audio-visual presentations. Approximately 600 requests for publications were filled.

Branch staff assisted with many department programs and activities, among them the South Saskatchewan basin planning program, drought emergency relief, Oil Drop (used lube oil recycling), the opening ceremony for the Dickson Dam, the Cold Lake-Beaver River water management study, a workshop on enforcement and the acid deposition research program.

A public affairs officer at the Alberta Environmental Centre in Vegreville provided communications services for local, scientific and technical audiences. He helped organize 88 tours for more than 500 people, an open house which attracted 700 visitors, a crops field day, 11 technical seminars and an international scientific symposium.

The officer produced an annual review and handled printing of 74 publications, including six technical reports. Plans were made for a new display system, a brochure on the Centre and a quarterly newsletter. Writing assignments included an article for a biologist's newsletter and press releases. In addition, about 49 media interviews were recorded.

Library Services Branch

The branch provides environmental information to people in the provincial government, industry, and environmental groups and students.

The library purchases, organizes and distributes all books, documents and periodicals for the department and supervises regional office libraries.

Users from outside the department accounted for 42 percent of interlibrary loans and 20 percent of the time spent responding to requests for information.

Automation of library activities continued with the purchase of a computerized circulation system. A cooperative project by the Alberta Research Council, Environment and Agriculture, to document SCITECH, the automated cataloguing system, was completed. The cataloguing software was made available to the Alberta Labour and Legislature libraries.

ENVIRONMENTAL PROTECTION SERVICES

Carl L. Primus, B.Sc.
Assistant Deputy Minister

R.N. Briggs, P.Eng.
Director
Pollution Control Division

Jerry C. Lack, P.Eng.
Director
Standards and Approvals Division

H.A. Kerr
Director
Earth Sciences Division

H.P. Sims, Ph.D.
Director
Research Management Division

Murray Ellis, P.Eng., M.B.A.
Program Planning

The role of the service is to prevent or control pollution and to encourage research into applied solutions for environmental problems.

A major part of the program involves the setting of standards which govern the maximum amount of contamination permitted to enter the environment from most man-made sources.

Another key part of the program is the monitoring of the environment - principally the air, water, wastes and pesticides - to ensure the standards are being followed and, where necessary, to enforce compliance with the standards.

Research activities focus on finding solutions which are directly applicable to a wide range of environmental problems, including those related to human interactions as well as to man's impact on the natural biological and physical systems.

The service administers grants to assist local authorities in developing regional waste management facilities and non-profit organizations in establishing recycling centres.

POLLUTION CONTROL DIVISION

The division enforces the Clean Water Act, the Clean Air Act, the Agricultural Chemicals Act, the Hazardous Chemicals Act, the Litter Act, the Beverage Container Act and regulations.

Air Quality Control Branch

The purpose of the branch is to achieve air quality within established standards.

The branch enforces the regulations under the Clean Air Act and terms and conditions of clean air licences, does general air monitoring, maintains an extensive air quality monitoring network and samples emissions from stationary sources. Industry is required to monitor its operations and the branch reviews and verifies the results.

During the reporting period, six air quality directives and five emission control orders were issued for contraventions of the Clean Air Act and three offenders of the Act were prosecuted.

The branch investigated the following complaints: (See Table 2). The number of complaints received by the branch in 1984 increased 32 percent from 1983 totals.

Urban air quality monitoring: The air monitoring network for Edmonton and Calgary consists of 67 total sulphation stations, 67 dustfall stations, three fluoride stations, six soiling index analysers, six high-volume samplers and nine comprehensive continuous air monitoring stations. Each of the continuous stations had instrumentation to detect carbon monoxide, ozone, oxides of nitrogen, nitrogen dioxide, sulphur dioxide and total hydrocarbons.

Four of these stations were based in Edmonton, four were in Calgary and one was used for monitoring the other major urban areas. An air quality index (IQUA) based on levels of the most significant air pollutants (nitrogen dioxide, carbon monoxide, ozone, sulphur dioxide and smoke) in Edmonton and Calgary was released daily to the media and public.

The monitoring network for smaller urban centers consists of one high-volume sampler, 33 total sulphation, 29 hydrogen sulphide, 19 total dustfall and 9 fluoride exposure cylinder stations. A comprehensive survey was carried out in Fort Saskatchewan.

Rural industrial air quality monitoring: The branch operated four mobile laboratories in the Red Deer, Whitecourt, Calgary and Edmonton areas. The laboratories continuously monitor sulphur dioxide, hydrogen sulphide and wind speed and direction. Special air quality monitoring surveys were conducted in the Sundre, Rimbey, Quirk Creek, Crossfield, Killam, Fort MacKay and Fort McMurray areas.

A network of 32 total dustfall, 154 hydrogen sulphide, 159 total sulphation and four fluoride exposure cylinder stations were maintained near rural industrial operations.

Monthly precipitation samples were collected and analyzed at six locations: Suffield, Calgary, Red Deer, Edmonton, Whitecourt and Beaverlodge, as part of an assessment of acid deposition in Alberta

Industry compliance review: The branch received monthly and annual reports from major industries such as

Table 2
Complaints investigated by Air Quality Control Branch

	Urban area		Rural area		
Type of complaint	Edmonton	Calgary	North	South	Total
Odor	126	101	89	155	471
Dust	38	49	41	62	190
Smoke	25	13	24	29	91
Noise	4	0	5	3	12
Misc.	6	3	18	8	35
Total	199	166	177	257	799
Percent Resolved*	43.2	51.2	42.9	29.6	40.4

The number of complaints received by the branch in 1984 increased 32 percent from 1983 totals.

fertilizer, petroleum, gas processing, pulp and paper, meat packing, thermal power, steel, rendering, chemicals, plastics, cement and wood products. These reports were checked for compliance with licence requirements, and the branch investigated cases of noncompliance.

Table 3
Reports reviewed per year as required by clean air licences

	1980	1981	1982	1983	1984
*	3043	3182	3262	3438	3538
**	246	276	266	249	220

* Monthly reports required by licence.
** Annual reports required by licence.

Air pollution source monitoring: In 1984, 220 sampling tests were conducted on 55 stacks at 26 plants to assesss the air contaminant emission rates from stationary sources and to check compliance with approved limits. A gas chromatograph for on-site source sampling was used to measure vinyl chloride monomer and total reduced sulphur compounds.

Source emission surveys conducted by industries were reviewed for compliance and acceptability of sampling technique. Branch staff witnessed some 66 source emission surveys done by industry or consultants.

Meteorology and chemistry: The Edmonton air pollution meteorological station (rural) gathered data on wind, temperature stratification and turbulence. A Doppler Acoustic Radar measured the three components of the wind up to an altitude of 500 metres.

The guideline plume dispersion models and the sulphur deposition model were made available on floppy disks for computer application. An upgraded frequency distribution model was verified against oil-sands monitoring data and used by the Research Management Division in correlations with tree growth.

Staff participated in a workshop on mesoscale acid deposition modelling and monitoring in western Canada.

During the summer, two additional wet acid deposition stations were set up in the Calgary area to assess the representativeness of the existing site. No significant differences were found.

A contractor provided mathematical methods for addressing the effects of plume fluctuations on pollutant concentraton. Another contractor examined the feasibility of using an ice core from a glacier to document the chemical composition of rain and snow in the past.

Other activities: Inventories of sources and emissions for Edmonton and Calgary were updated.

Increasing use is being made of microcomputers, especially in data base management. A new system for keeping track of the most important information from monthly industry reports is being completed. The system will allow staff to rapidly review a company's emissions and compliance with air quality control requirements.

The branch worked on developing operational and reporting guidelines for continuous emission monitors on industrial stacks. The guidelines will ensure more uniform operations and better quality of data.

During 1984, the branch noted increases in the use of mobile ambient air monitoring units to investigate complaints and identify problems and the use of gas chromatography to sample emission sources.

Municipal Engineering Branch

The purpose of the branch is to achieve water quality within established standards.

The branch enforces the Clean Water Act and regulations with regard to municipal water and sewage systems. Other responsibilities include monitoring municipal water and sewage systems, investigating complaints, providing technical advice and training and educating municipal water and sewage operators.

Field Service Section: This section is responsible for monitoring, surveillance and enforcement. These activities are undertaken through offices in Edmonton, Grande Prairie, Lethbridge and Red Deer.

Table 4 indicates the general level of activity for the section compared to previous years.

Table 4
Field Services Section
Activity Comparison

	1982-83	1983-84	1984-85
Inspections	900	1180	1288
Problem investigations	57	127	84
Composite sampling	44	48	58
Communities inspected	320	366	386
Semi-public facilities inspected	60	64	77

Major activities during the year were monthly sampling and analyzing of treated water (increased to 13 communities); split composite sewage sampling (increased to five communities on a monthly basis); dye studies of several aerated lagoons and comprehensive aerated lagoon evaluation; detailed winter survey of about 20 communities for giardiasis ("beaver fever"). More than 200 samples were collected and examined.

Investigations carried out included: sewage problems at High River; summer and winter drought programs in Claresholm, Coutts, Milk River and other municipalities; iron sequestering using silicate as an alternative to iron removal; the causes of and remedial measures for higher triahalomethane values in the Fort McMurray water supply; and discharges to the North Saskatchewan River from Edmonton's sewer system. In addition, discussions were held with the city of Edmonton to develop a long term plan for reducing or eliminating sewage discharges into the storm sewer system.

As part of enforcement activities, water quality control orders were issued to Provost Packers Ltd. and Provost Mobile Homes Ltd. to stop sewage discharges and a water quality directive was issued to the town of Peace River to eliminate a septic tank discharge.

Monthly reports required by licences were reviewed. Overall, water treatment facilities complied with licences about 70 percent of the time. Municipalities complied with sewage licence requirements about 60 percent of the

time. Annual summaries were prepared for facility descriptions, water and sewage effluent quality, treated water survey, split sewage composite and bacteriological quality.

General field activities increased substantially. Inspections increased due to the hiring of temporary staff for giardiasis monitoring. Additional effort was also directed toward finding and inspecting semi-public facilities such as subdivision and central well supplies. Work continued on improving branch and departmental organization and preparation to respond to potential war and civil emergencies that could affect municipal water and sewage facilities.

Operator Training and Certification Section: The section is responsible for the operator training and certification program.

A total of 13 short courses and seminars and two correspondence courses were given by branch staff. The object of the program is to provide training to municipal water and wastewater treatment plant operators in order to upgrade their skills.

The total registration for the short courses and seminars was 427 and 70 for the correspondence courses. Participants represented 119 Alberta communities.

Branch staff provided input to the Water and Wastewater Technician Program at Westerra Institute of Technology. The program is in its second year and as of January, 1985, had 24 registered students.

Assistance was given to other organizations concerned with operator training, such as the Western Canada Water and Sewage Conference, the Federation of Associations on the Canadian Environment and the Water Pollution Control Federation.

On January 1, 1984, all cities and towns with a population of more than 1,500 were required to have at least one certified operator for their water and wastewater facilities. By July 1, 1985, all cities, towns and villages must have certified operators in charge of their facilities.

During the year, 263 new certificates were issued to operators. Of those, 147 were restricted (no examination required) while 116 were earned based on minimum education and experience requirements plus an examination. As well, 63 operators upgraded their certificates by passing certification exams and 95 certificates were renewed for a further two years.

Pesticide Chemicals Branch

The branch has responsibilities in three areas: licensing, training and enforcement under the Agricultural Chemicals Act, coordination and development of pesticide management training programs; issuing of permits for and monitoring of aquatic and industrial vegetation management programs and administration, coordination and supervision of the Municipal Biting Fly Control Financial Assistance Program.

Licensing, training and enforcement: The branch licensed 1,100 pesticide applicators and 470 pesticide vendors. Fifty-five permits were issued for the application of restricted or experimental pesticides.

Training courses and seminars were held in Olds, Edmonton, Vermilion, Fairview and Red Deer, with 950 persons attending. More than 200 people enrolled in a home study course for pesticide applicators while some 100 persons enrolled in a home study course for pesticide dispensers.

One hundred and eighty complaints were investigated during the year.

During the year, 2,100 inspections of pesticide vendor outlets, warehouses, permit sites and transport facilities were conducted. Thirty-eight pesticide container collection sites were monitored for possible leaching to groundwater. No residues were detected.

Aquatic-terrestrial surveillance: A total of 287 permits were issued to apply pesticides on, in or near water and for chemical vegetation management in the Green Area. Staff conducted 115 site inspections before, during and after pesticides were applied.

Six monitoring programs were conducted to determine herbicide persistence and movement in forest and water habitats.

Assessments were carried out on: the effectiveness of physical bottom barriers in suppressing submergent aquatic plants in lakes; selective control of woody plants on a pipeline right-of-way; the options for managing Reed Canarygrass in irrigation systems; and the effectiveness and dissipation rate of the herbicide Magnacide 'H'.

A survey was conducted to determine the diversity and abundance of acquatic weeds in irrigation canals. Six reports/manuals were released.

Efforts were made to increase public awareness of the aquatic weed Eurasian Water Milfoil. Highway and boat launch signs, public displays, posters, brochures and bumper stickers were used to acquaint Albertans with the weed, the problems associated with it, and to help prevent it from spreading into the province.

Biting fly abatement: Grants totalling $617,302 were awarded to 34 municipalities (total population 1.5 million Albertans) which participated in the 1984 biting fly control financial assistance program. Three municipalities started new control programs in 1984. Section staff attended council meetings of seven municipalities to advise on mosquito control and financial aid.

Contracts for $36,063 were processed by the section. Support was given to studies related to biting fly biology and control methods.

Branch staff carried out 193 routine monitoring and inspection checks of biting fly control programs during 1984. They also investigated several complaints of biting fly problems and pesticide applications. Information and technical assistance were provided to municipalities and the public through the media, visits, bulletins and seminars and training courses on safety, management and control of pesticide chemicals, and the biology of mosquitoes and black flies.

The section trained and provided licence examinations for 49 Class 'L' pesticide applicators and issued 40 permits (required under the Agricultural Chemicals Act) for municipal mosquito and black fly control programs.

At the request of the Saskatchewan government, staff participated in two training courses offered in that province. Technical assistance was given to the government

of the Northwest Territories on several occasions.

Branch staff studied the potential for biological control of mosquitoes using parasites and predators native to Alberta; determined factors contributing to the production and control of large mosquito populations in irrigated districts; screened larvicides proposed for future mosquito control programs; and monitored the Athabasca River to determine the effect of methoxychlor on non-target organisms.

Special programs: Ten new permanent pesticide container collection sites were given funding during the year, bringing the provincial total to 82. More than 500,000 containers were collected and most were recycled at steel mills.

Publications: "The Pesticides Fires and Spills Handbook" was completed and distributed. A "Pesticide Poisoning Manual" was developed.

Staff provided representation on federal and provincial committees dealing with the use and disposal of chemical compounds, research priorities, and the environmental impact of abatement programs.

Waste Management Branch

The branch is involved in managing industrial and hazardous wastes and resource recovery through recycling and re-use. The branch administers the Hazardous Chemicals Act, the Beverage Container Act and the Litter Act.

Special waste management: Generation and disposal of special wastes was a major environmental issue in 1984-85. Work started on the central treatment facility near Swan Hills. Amendments to the Hazardous Chemicals Act and the Hazardous Waste Regulations were proclaimed.

The branch gives technical and financial assistance to municipalities for advanced waste management and facilities. In 1984-85, grants were made to the following regional waste management authorities to set up regional sanitary landfills: High Level ($450,000), Beaver ($409,563), Flagstaff ($32,658), Camrose Regional ($60,000) and Rocky Mountain ($914,152). Through the program more than 60 open burning dumps will be or have already been closed.

The branch also provides information and advice on the safe handling and disposal of hazardous wastes and makes sure that chemical spills are properly cleaned up. Advice is given on how to restore former dumps.

Resource recovery: The branch promotes recycling and reuse of resources by providing information and technology transfer to industry, municipalities and the public. Grants are given to non-profit groups and municipalities to purchase recycling equipment such as containers for glass or paper and used-oil collection tanks.

The branch administers the Beverage Container Act which established the Alberta container depot system. In 1984-85, 184 licenced depots in Alberta accepted empty soft drink bottles and cans, liquor and wine bottles and juice cans. Glass, metal and plastic containers returned to depots are recycled into other useful products.

Fourteen tanks and six systems were installed to collect used lube oil. More than 275 service stations which take oil back from the public participate in Alberta's "Oil Drop" program.

There were 19 projects to collect paper.

A project was started to collect used household glass containers and a facility was operated in Edmonton to sort government paper for recycling.

Twenty-three resource recovery grants ranging from $2,500 to $15,000 were given to communities and organizations to fund recycling projects.

Litter control: The branch administers and enforces the Litter Act. This act authorizes police and local enforcement officers to issue tickets for littering and clean-up orders for unsightly premises. The branch also works with, and financially supports, Outdoors Unlittered Inc., a non-profit organization engaged in anti-litter campaigns and educational programs.

Water Quality Control Branch

The objective of the branch is to preserve good water quality in lakes, rivers and streams through monitoring and enforcement. Major functions during 1984-85 were monitoring lakes, rivers and streams for water quality, monitoring industrial plant waste waters to ensure compliance with standards and investigating complaints and accidental spills affecting surface and groundwater quality.

Lakes, rivers and streams: A water quality planning study was started on the Athabasca River in 1984. Sampling will provide information on changes to water quality in the river basin from tributary streams and effluents entering the river. This information will be used to design a sampling program that will be used to calibrate a predictive model for a basin plan.

A monitoring network was established on the McLeod River to determine the effects of logging and coal mining. The information will be used to plan development for the region.

The Battle River was sampled six times during 1984 to define water quality in different reaches of the river and find out what sources affect it. This information will be used to find ways of improving water quality in the river and to design a river basin development plan.

A study of the Oldman River was started in 1984. The study will provide a detailed data base for the river basin so that river water quality can be characterized in different reaches. Data for tributary streams and municipal and industrial waste waters were obtained to determine the effect on the river. Samples included macroinvertebrates and other biological specimens, as well as sediment and water for chemical analysis. This information will be used to assess the effect of the Oldman River dam on downstream river quality.

Sampling in the Cold River basin in Saskatchewan was completed in 1984. The purpose of this study was to find out how the Cold River and lakes fed by the river would be affected if water from Cold Lake is used for heavy oil development.

A survey of lakes in northern Alberta was completed during the year. The information was analyzed to deter-

mine the sensitivity of Alberta lakes to acid deposition. Sensitivity maps are being constructed based on calcium, alkalinity and total dissolved solids values.

Industries: All industries licenced to discharge plant process waste water were inspected and samples were collected to determine compliance with licence standards. This data and monthly and annual reports from each plant were the basis of the branch's enforcement program.

During industrial inspections, waste water treatment facilities were evaluated to determine their efficiency and whether waste water quality can be improved.

Industrial monitoring data is also used to review the standards when licences are being renewed.

Spills: In 1984, 125 spills were recorded and investigated. Of these, only six spill investigations were not fully concluded. These spills involved underground contamination which requires a longer period to achieve satisfactory recovery.

Complaints: One hundred and fifty-five complaints were received in 1984, many of them related to illegal discharge of wastes, fish kill and deteriorating lake water quality as characterized by an increase in algae. In most instances, an increase in algae and other aquatic plants in lakes is primarily due to natural causes that cannot be controlled.

STANDARDS AND APPROVALS DIVISION

The division issues permits and licences for construction and operation of municipal and industrial facilities covered under the Clean Air and the Clean Water Acts.

Permits require that the best practicable technology be used to control pollutants at the source. If the pollutant would significantly affect health, permits require the best available technology. Licences specify operating, monitoring and reporting requirements.

The division sponsors studies to update standards for pollutants and participates in federal-provincial committees for establishing air and water quality standards.

Air Quality Branch

The main goal of the branch is to achieve and maintain acceptable ambient air quality by administering regulations, guidelines and policies under the Clean Air Act.

In 1984-85 the branch continued to assess the impact of new industrial developments on air quality and reviewed applications to renew industrial licences.

During the fiscal year the branch issued 138 permits, 257 licences, two certificates of variance, 11 amendments to permits and 118 amendments to licences (see Table 5).

Staff participated in Energy Resources Conservation Board hearings and on several committees dealing with acid rain-causing emissions. The branch was represented on the National Air Quality Objectives Sub-Committee and contributed to the development of criteria documents and ambient air quality objectives.

Regulations were proposed to exempt small, sweet gas processing plants from the approval requirements under the Clean Air Act.

A study was carried out on aerodynamic downwash from gas plant incinerator stacks.

Water Quality Branch

The branch is responsible for achieving and maintaining acceptable water quality by developing objectives, guidelines, standards, reports and regulatory approvals under the Clean Water Act.

A total of 91 permits and 208 licences were approved for constructing, altering or operating industrial plants or related facilities (see Table 6). In addition, 11 letters of permission were issued authorizing the temporary release of liquid effluents under controlled conditions. Fifteen records of exemption were issued for projects not requiring licences, permits or letters of permission.

Twenty-three new applications for certificates of compliance were received from intensive livestock operations in the southern part of the province and 16 certificates were issued. Four certificates were issued from 20 new applications received in the northern region. Assistance was provided for a microbiological research study of feedlot operations being conducted by the Alberta Environmental Centre.

Additional major activities of the branch during 1984-85 were:

- a review of the study report of the Twin Butte Soils and Water Evaluation Task Force,
- a review of settling pond design for coal mine applications,
- a contingency plan to keep member agencies of the Prairie Provinces Water Board informed of major spills in eastward-flowing rivers;
- industry/Alberta Environment study of toxicity of flocculants for coal mine applications;
- a report on synthetic liners for waste impoundments;
- guidelines for sulphur handling;
- assessment of regulatory approvals of other jurisdictions;
- participation in the Makin Pulp and Paper Mill Water Quality Task Force;
- inventory of water quality sampling and analysis; and
- a review of water quality requirements at interprovincial monitoring stations.

Much time was spent reviewing industrial applications and preparing permits and licences. Representatives of the branch served on committees to review industrial proposals and facilities.

Solid waste disposal and its effects on groundwater at industrial sites required more attention. The branch also saw a need for further evaluating the use of industrial wastewater for irrigation.

Municipal Engineering Branch

The main responsibility of the branch is to ensure that municipal water supply systems and sewage works provide a high level of both public health and environmental protection.

Reviewing and approving municipal water, sewage and storm water projects and licensing of water and sewage treatment facilities were major activities.

A total of 229 new permits to construct were issued, and 42 amendments to permits to construct were processed. A total of 49 licences to operate were issued or renewed for municipal systems (see Table 7). In addition, the branch issued 79 certificates of compliance for satisfactorily meeting permit conditions and 23 letters of permission authorizing land application of sewage effluent or sludge.

The development of guidelines, design manuals and technical reports continued to be a major activity of the branch.

A review of septic-tank and drainage-field-sewage disposal systems was completed under contract as the first step in developing a guideline and design manual for these types of systems. Development of a detailed computer inventory of the 1,000 municipal water-supply and sewage-treatment systems in the province commenced. This inventory will greatly help the branch respond to requests for information.

Studies on storm water management and water filtration were commissioned. The branch and the federal government are having audio-visual slide material prepared on land application of municipal wastes and are also co-funding a major study on water-treatment alternatives being conducted by the University of Alberta.

The branch continued its activities with the federal-provincial working group that is updating the Canadian drinking water quality guidelines. The branch is also helping to organize a national drinking water conference on treatment for organic contaminants.

Staff spent a great deal of time helping municipalities and their engineering consultants plan, select and design water-supply systems and sewage works. Advice also continues to be provided to the Department of Utilities and Telecommunications on municipal projects being considered for financial assistance.

Industrial Wastes Branch

Branch activities included: reviewing applications for industrial waste disposal to land, including land filling, land farming and deep well; reviewing applications for approval of *in-situ* heavy oil experimental schemes; inspecting, on behalf of the Atomic Energy Control Board, those facilities in Alberta which hold Board approval to emit radionuclides; participating on the federal-provincial consultative committee on low-level radioactive waste management; training visible emission readers; preparing guidelines outlining requirements for hazardous waste storage, incineration and land-fill disposal; and supplying upon request disposal methods for industrial wastes to the general public.

Table 5

Air Quality Permits and Licences 1984-85

Category	Permits	Licences
Agricultural activites including meat-processing plants	6	18
Asphalt plants	6	18
Chemical plants	6	17
Coal processing	1	1
Compressor stations	20	68
Experimental *in-situ* oil sand operations	18	10
Fertilizer plants	1	1
Gas processing plants	61	81
Incinerators	9	30
Oil refinery operations	0	4
Oil sands plants	3	1
Others	7	8
TOTAL	138	257

Table 6

Clean Water Act Approvals Issued 1984-85

Category	Permits	Licences
Asphalt plants	3	14
Chemical plants	1	7
Coal processing	7	3
Concrete and cement	0	0
Fertilizer	1	1
Fiberglass	0	1
Food processors	2	5
Gas plants	39	117
Meat packing and processing plants	3	9
Oil sands plants	20	14
Petroleum refineries	2	4
Power plants	0	0
Pulp mills	1	1
Salt caverns	2	3
Sand and gravel washing plants	4	13
Snow disposal sites	0	1
Tar sands	3	1
Wood processing	1	3
Steel works	0	1
Miscellaneous	2	10
TOTAL	91	208

Table 7

Municipal Engineering Permits and Licences 1984-85

Category	Permits	Licences
Water supply	74	12
Sewage treatment	33	37
Water and sewer extensions	100	—
Storm sewer systems	22	—
TOTAL	229	49

EARTH SCIENCES DIVISION

The division assesses, controls and protects soil and groundwater resources.

Major activities include researching soil acidification, operating observation well networks, maintaining and disseminating groundwater information, enforcing the Ground Water Development Act, monitoring earth tremors and rockslides and operating an earth sciences laboratory.

These activities are carried out by three branches: Hydrogeology, Groundwater Protection and Soil Protection.

Hydrogeology Branch

The branch has five sections responsible for exploration and inventory, geology, groundwater information, engineering and groundwater technology. The branch does hydrogeological mapping, geophysical monitoring and groundwater impact assessment, investigates domestic and municipal water well problems, deals with the water well drilling industry and compiles groundwater information.

In 1984-85 branch staff upgraded the observation well network, developed microfiche groundwater data files, managed the Drought Emergency Ground Water Supply Program and did geologic mapping to establish the base of groundwater protection.

Observation wells: Twenty-seven new wells with continuous water-level recorders were added to the provincial observation well network. The number of wells monitored is now more than 200. Ten wells, in the drought areas of southeastern Alberta, were completed for future inclusion to the network.

A study is continuing in the Edmonton area to determine the effect of different well casings on water quality.

Two projects were completed in cooperation with the University of Alberta physics and geology departments. For one project, two tilt indicator holes were drilled near a groundwater observation well; for the other project, a test hole and well were completed, aquifer tested and a water-level recorder installed to obtain detailed groundwater information in the Cypress Hills area.

Groundwater information: The Groundwater Resources Information Service is the main data bank of groundwater information in the province. Microfiche is used to store and disseminate technical data such as drillers' logs, chemical analysis and hydrogeological reports. Paper copies are also available.

During the year the service responded to 2,472 enquiries. The complete groundwater data file was made available to the private sector in computer readable format. This enabled private industry to compile and map flowing seismic test (shot) holes and wells in the province.

The service was reviewed, and recommendations made for the best use of modern electronic technology.

Drought Emergency Water Supply Program: At the end of the reporting period, about $882,000 was paid in grants for drilling domestic and municipal test holes and construction of wells. There were 1,368 applications from domestic users with about 83,904 metres of test hole being drilled by water well contractors.

Applications from eight municipalities were approved with wells completed in Coutts, Skiff, Sibbald, and the Pincher Creek and Calgary areas. A regional test hole was drilled near Claresholm.

Base of groundwater protection: A geological study of freshwater bearing formations in southern Alberta was completed. Formations containing potable water along with their depth and area were identified. Consultants were contracted to draft eight regional cross-sections to determine the geologic relationships of the aquifers. The data will be used to establish the depth to which groundwater should be protected from contamination.

Cold Lake seismic project: As a result of public concern, an earthquake monitoring network was established in 1981 near the Cold Lake Esso Heavy Oil project. During 1984-85, little change was recorded in the frequency of seismic activity. Of some 80 seismic events, 62 were at a shallow depth with Richter magnitudes of less than 1.6. This size of earth tremor is not normally felt.

The branch is continuing studies to define the relationship between these events and activity by oil companies. Other nearby seismic events are related to military activity. More than 250 distant earthquakes and nuclear tests from around the world were also recorded. Some of the data is used by the University of Alberta in regional seismicity studies.

Groundwater Protection Branch

The branch protects shallow groundwater quality through various monitoring and site approved programs. The emphasis in 1984-85 was on landfill siting and monitoring, investigation of shallow groundwater contamination from hydrocarbons and control of seepage from main irrigation canals.

Landfills: Sites for regional and modified landfills are investigated for local governments. Branch staff assess hydrogeologic conditions at proposed new landfill sites to make sure that there is little risk of groundwater contamination. The branch also assists local authorities with site selection by providing maps, evaluations and on-site testing. Reports describing hydrogeology were prepared for proposed regional landfill sites at Wainwright, Blue Ridge, Whitecourt, Ross Haven, Hinton and Redcliff.

Ground monitoring systems have been established at 11 regional landfills. Water levels are recorded up to three times annually and groundwater samples are collected annually for chemical analysis.

Monitoring results were reported for the Wetaskiwin (County of Wetaskiwin) and Drayton Valley (County of Parkland) regional landfills. In addition, an update report was prepared for the Sedgewick (County of Flagstaff) regional landfill. Groundwater monitoring studies were also done at several smaller waste disposal sites. Work at these sites included installing a monitoring system, reviewing data and preparing a short report. Studies were done at the Viking, Hillspring, Glenwood, Gleichen and Lomond waste disposal sites.

Hazardous waste project: In March, 1984, a site near Swan Hills was selected for Alberta's special waste treatment facility. A monitoring program to collect data on both groundwater levels and water quality was started at the site in early summer. A consultant conducted quarterly sampling of groundwater observation wells. The program was completed in March, 1985.

The Alberta Special Waste Management Corporation has since established a permanent groundwater monitoring system which will be expanded as the facility develops. The Groundwater Protection Branch has a representative on the monitoring review committee which will oversee site monitoring.

Irrigation headworks: Soil and shallow groundwater conditions along canals operated by the department are investigated to determine seepage problems. The results are used in design and other measures to control seepage.

Major reports were completed for Reaches 2B and 3B of the Lethbridge Northern Irrigation District (LNID) main canal. Supplementary seepage control designs were provided for Reaches 3A and 7A (LNID) and for the Bow Island to Sauder reach of the St. Mary River Irrigation District (SMRID) main canals. An evaluation of seepage control requirements of the Western Irrigation District main canal was completed.

Other studies investigated seepage damage complaints on the SMRID, Mountain View-Aetna, Bow River Irrigation District and Sheerness blow-down canal systems. Monitoring and evaluation studies were done on five reaches of the LNID and SMRID systems.

Shallow groundwater contamination: Branch staff investigated the effects of petroleum leaks from storage tanks on groundwater. They responded to 15 reported incidents and drilling was done at three places where petroleum products were detected but the source was unknown.

Monitoring was done at three industrial sites where groundwater quality is being improved and at three other sites where quality problems are being evaluated by industry prior to initiating quality improvement programs.

Rural water development: Demand for this service to improve on-farm water supplies has increased 80 percent over the previous year due to drought conditions. Soil investigations were completed on 281 dugouts and small dam sites. Negotiations have been started to transfer the program to Alberta Agriculture.

Country residential subdivisions: The branch assesses both groundwater supplies for developments serviced by water wells and the suitability of subsoils and water table conditions for sewage treatment systems. Staff reviewed and evaluated 48 technical submissions supporting applications for country residential subdivisions.

Dryland salinity: This program was provided in cooperation with both Alberta Agriculture and Agriculture Canada (PFRA). At year-end the Alberta Environment program was transferred to Alberta Agriculture. Equipment will be available on request to assist Alberta Agriculture with dryland salinity investigations.

Soil Protection Branch

The branch seeks solutions to soil pollution which occurs when contaminants generated by human activities hinder plant growth.

The branch's expertise includes soil chemistry, physics, microbiology, pollutant chemistry and land-use capability. Branch programs examine the effects on soil of acid deposition, land application of municipal and industrial wastes and reclamation. The branch has a laboratory service.

Soil acidification: The Alberta Research Council is contracted to prepare maps showing soils sensitive to acidification and the ability of subsoil materials to neutralize acid. The maps will be published in 1985.

Soil acidification monitoring sites were established in the Devon and Bruderheim areas. They are a part of a network of eight sites which will be monitored for 44 years to give an early warning of soil acidification from acid deposition.

Laboratory and greenhouse studies were carried out on the results of soil acidification on soil phosphorus. The potential to generate plant-available nitrogen is being assessed for usefulness as a biological indicator of soil acidification. Soil pH studies, part of the sour-gas plant monitoring program, will be completed in 1985. The usefulness of series-level of soil classification in establishing soil chemical properties was studied for nine major series from the Beaverlodge area.

The branch helped organize a provincial soil acidification workshop.

Land application of municipal and industrial wastes: The branch continued investigating land spreading of wastes such as municipal wastewater and sludge, saline drilling muds and oil-field sludges.

A study of the potential for using municipal wastewater to irrigate in the Red Deer, Bow and South Saskatchewan river basins was completed.

Reclamation: A number of projects examined methods of reclaiming drastically disturbed land. The Bow City project assessed treatments for reclaiming sodic mine spoil. Others investigated prolonged storage of stockpiled topsoil, the use of bottom ash as a barrier to upward salt movement from saline, sodic mine spoil and the required depth of suitable soil materials surface placed after mining.

In future, the branch will adopt a consultative role in reclamation of drastically disturbed land. Activity will be concentrated on assessing and preventing soil pollution from industrial activities.

Analytical services: Laboratory analyses of soil, plant, waste materials and water were done for the department and other agencies. The number of samples (and parameters) analyzed were: soil, 7,624 (11,250); plant, 576 (4,600); waste material, 18 (210); water, 3,213 (51,250) and microbiological, 240.

The branch worked on developing and maintaining (self-regulated) quality assessment practices and laboratory automation.

Table 8

Hydrogeology Branch Summary

Program	1982-83	1983-84	1984-85
Groundwater Administration:			
Driller inspections	619	633	464
Well complaints	100	76	66
Drillers' reports submitted	5,856	5,661	5,662
Information requests	1,739	2,772	2,472

Table 9

Groundwater Protection Branch Summary

Programs	1983-84	1984-85
Landfill Siting		
Site selection maps	6	12
Modified landfill evaluations	78	75
Regional landfill evaluations	53	68
Monitoring	10	16
Groundwater Contamination		
Sewage lagoon appraisals	24	25
Rural Water Development (dugout and small dam tests)		
Southern Alberta	141	253
Peace River District	46	28
Country Residential		
Subdivision appraisals	95	48

RESEARCH MANAGEMENT DIVISION

The division manages research, publishes reports and gives scientific advice and support services to departmental staff.

The division's expertise is drawn from such fields as hydrology, climatology, pedology, biology, meteorology, ecology and sociology.

During the year, the division managed 44 contracts for research projects. Twenty-three were with consulting companies and 21 with universities.

The division was represented on 52 committees. A list is in the 1984-85 RMD Review available from the publications office.

Eight research programs were fully active during 1984-85. In addition, the environmental emergencies and risk assessment program was developed and the environmental information program was under review.

Many of the division's projects received funding from the Heritage Savings Trust Fund or from private industry.

Research Programs

Acid deposition research: This program involves research on the environmental impact and the medium to long-range transport of acid forming emissions (oxides of sulphur and nitrogen). The results will help scientists understand the potential for environmental acidification. Efforts are mainly directed to the determination of potential impacts in the northern forested areas of the province, including the oil sands areas. They will be used to evaluate Alberta's air quality standards and to help plan provincial industrial development.

The acid deposition program also includes the Alberta Government/Industry Acid Deposition Research Program (ADRP), an $8-million project of the Alberta government, petroleum industry and electrical utilities to assess the effects of acid forming gases from sour gas industries on the environment and human health.

Research will focus on two principal gas groups: oxides of sulphur and oxides of nitrogen. Human health research will address the concerns of residents downwind of major emission sources. Research concentrates mainly on agricultural areas in the southern part of the province.

An important feature of the program is the integration of biophysical and human health studies.

Air quality/climatology: The air quality sub-program characterizes and delineates the consequences of atmospheric pollutants on air quality, the environment and climate.

The climatology sub-program examines climate variability and its effects on the management and development of Alberta's resources. It will complement the Canadian climate Program as recommended by the Canadian Council of Resource and Environment Ministers. A departmental representative is chairman of the Alberta Climate Advisory Committee. Other members are from the Alberta departments of Agriculture, Energy and Natural Resources; the Atmospheric Environment Service; the Alberta Research Council; the Canadian Petroleum Association; the Alberta Climatological Association and the Alberta Environmental Centre.

Alberta oil sands environment research (AOSERP): Research on the environmental effects of Athabasca oil sands development began in 1975.

The program has become active in other oil sands areas in Alberta, notably Cold Lake. Inventory, baseline research and data collection were completed in the first five years. Now AOSERP funded research is looking for applied solutions to environmental problems from oil sands developments.

Environmental contaminants: The objectives of this program are to develop a means to identify and evaluate contaminants within Alberta and accumulate data on the fate and effects of contaminants in the environment.

Of particular concern is mercury contamination of water associated with the construction of new reservoirs and the potential contaminants produced by *in-situ* oil extraction and combustion processes.

Geoscience research: This program co-ordinates research on natural resource development and land use and their impacts on the environment. It includes research in geology, geophysics, civil engineering and soil science.

Reclamation research: This program identifies better methods of reclamation. For example, research is being done to determine methods of rebuilding productive soils, to identify changes in surface water and groundwater after disturbance and reclamation, to develop native plant species for reclamation, to control erosion and to improve materials handling operations.

Recommendations from the program are used to refine the government's development and reclamation guidelines.

The chairman of the department's reclamation research committee is on the interdepartmental Reclamation Research Technical Advisory Committee (RRTAC), which co-ordinates the entire government program. Other members are from the Alberta departments of Agriculture, Energy and Natural Resources and the Alberta Research Council.

In 1984-85, RRTAC committed about $1.2 million from the Heritage Savings Trust Fund to reclamation research. Government and industry committees co-ordinate research in three biophysical regions, plains, mountains and foothills and northeast Alberta.

During the year, a two-volume work, **Land Surface Reclamation: A Review of the International Literature,** was published. This literature review provided a synthesis of all reclamation references of relevance to Alberta, and is a companion work to an earlier two-volume publication titled **Land Surface Reclamation: An International Bibliography.** These publications are available through the Queen's Printer.

Water and waste management: The program co-ordinates all Alberta research aimed at improving the understanding of the underlying principles of the management of water resources, water treatment technology and waste disposal and the interaction of water and waste. The objectives of the program are to address public concerns and to develop technology for water waste treatment.

Water resources research: Under this program, research is carried out in the areas of surface water and groundwater, their quantity and quality and the impacts of industrial development on water.

Two major programs are jointly sponsored with the Alberta Research Council: the Hydrogeology of the Cold Lake area, which is investigating the regional groundwater flow and the impacts of heavy oil exploration activities and the Cooperative Program in Surface Water Engineering, which is studying such issues as erosion of river banks, freeze-up and break-up of rivers and river flow forecasting.

Environmental emergencies and risk assessment: The objective is to identify and evaluate risks from uncontrolled releases of pollutants into the environment and develop strategies to protect the environment in emergencies.

Environmental information program: The objectives of the program, currently under review by RMD, are to identify environmental issues of public concern and to translate the results of all research areas into a form readily understood by those involved in policy and decision making.

WATER RESOURCES MANAGEMENT SERVICES

P.G. Melnychuk, P.Eng.
Assistant Deputy Minister

R.K. Deeprose, P.Eng.
Director
Technical Services Division

J.W. Thiessen
Director
Design and Construction Division

A.R. Strome, P.Eng.
Director
Water Resources Administration Division

J. Simpson
Director
Planning Division

F.G. Primus
Director
Operation and Maintenance Division

Water Resources Management Services manages and develops the province's water resources.

The objectives are to meet the water needs of Albertans, solve water-related problems and provide associated engineering services required by the department.

A major program, water management for irrigation use, involves rehabilitating irrigation headworks and canal systems and developing secure water supplies for irrigation, municipal, industrial and other uses in southern Alberta.

On August 9, 1984, the Government of Alberta announced it would proceed with construction of a water storage and flow regulation dam on the Oldman River. In 1984, the government appointed a project manager, reservoir and dam engineering consultants and a local advisory committee and began an environmental mitigation plan and land assembly.

The service assisted the Alberta Water Resources Commission with public hearings on water management in the South Saskatchewan River Basin. The service published background reports and the Commission followed with hearings in November and December, 1984. The Commission will make recommendations to the provincial government on the supply of water to be allocated among users, the priorities among options for water management and how much water each of the three major rivers (Bow, Oldman and Red Deer) will contribute to inter-provincial water apportionment.

An emergency water supply program was started in 1984 to alleviate drought in the southern part of the province.

Other major activities were: a flood protection and water management plan for the Paddle River basin; a water resources management plan in the Cold Lake-Beaver River basin; a provincial drainable lands inventory for water planning and management in central and northern Alberta and erosion and flood control works and stabilization of Lesser Slave Lake.

The Assistant Deputy Minister served as chairman of the Dickson Dam and Paddle River Dam review boards which advise the department on all technical aspects of the projects. In addition the ADM represented Alberta Environment on the Alberta Water Resources Commission.

The service represents the province in interprovincial and federal/provincial matters related to water management and implements water agreements with the federal government. In 1984/85 the ADM served on the Prairie Provinces Water Board and the Mackenzie River Basin Committee.

Prairie Provinces Water Board (PPWB)

Established in 1948, PPWB represents the governments of Canada, Alberta, Saskatchewan and Manitoba. The board administers the 1969 master agreement on apportionment for eastward flowing rivers and makes recommendations on water matters that come under more than one provincial jurisdiction.

Apportionment administration: Agreement was reached on how the waters of the Battle and Lodge Creek basins will be shared by Alberta and Saskachewan. Alberta developed a strategy and plan to meet its commitments under the agreement. The plan was in effect for the 1985 runoff season.

Hydrology: Special tasks included calculating natural flow in the Battle-Lodge basin at the Alberta-Saskatchewan-Manitoba boundary, in Pipestone Creek at the Saskatchewan-Manitoba boundary and return flow from irrigation districts in Southern Alberta. The service also sponsored the prairie hydrology workshop for government hydrologists.

Water quality: The committee on water quality continued developing short term and long term approaches for establishing water quality indicators at provincial boundaries. The two approaches were applied to the Red Deer, South Saskatchewan and North Saskatchewan rivers. In addition, Committee members exchanged information about the Cold Lake oil sands project, the Husky bi-provincial upgrader project and other downstream uses.

Groundwater: The committee on groundwater commissioned and reviewed a geological profile along the Saskatchewan-Alberta border. The profile and relief map showing data points depicts the basic geology and groundwater of a 10-mile wide corridor.

Mackenzie River Basin Committee

In 1984 bilateral discussions between Alberta and British Columbia, the Northwest Territories and Saskatchewan were initiated towards implementing a major recommendation of the 1981 Mackenzie River Basin Study Report dealing with transboundary water management. In addition, committee began operating an integrated hydrometric, meteorologic and water quality monitoring network for the Mackenzie Basin.

TECHNICAL SERVICES DIVISION

The division provides the department with river flow forecasting, river engineering, surface water hydrology and surveying services.

River Forecast Centre

The Centre monitors streamflow conditions, forecasts floods for disaster prevention and provides water supply forecasts. In addition, the Centre advises on reservoir control for water management, in particular, any action necessary to ensure that water is shared between Alberta and Saskatchewan according to the terms of the interprovincial Master Agreement on Apportionment.

Streamflow monitoring and forecasting: The Centre monitors weather, snowpack and streamflow conditions throughout the province. This information is used to prepare flood and water supply forecasts and to advise other agencies about changes in river levels.

Flood conditions resulting from rainfall or melting snow are analyzed and warnings issued to agencies responsible for preventing flood damage.

Many communities need streamflow data to determine the rate for discharging sewage effluent into rivers. Construction firms working in the floodplain of a river must be warned of expected changes in river levels.

The Centre publishes a weekly report on river conditions and trends for most large streams in Alberta. Members of the public, such as boaters, can call the Centre for latest up-to-date information.

Water Supply forecasting: The centre issues the "Water Supply Outlook and Snow Survey Bulletin" monthly from March to August. An annual summary report is also published.

The water supply for southern and central Alberta was generally below average during the summer of 1984. The water supply was particularly low in the Oldman and Milk River Basins.

Climatic network and data acquisition: Planning continues to expand the real-time hydrometeorological network into other areas where the present data base does not support a satisfactory river forecasting service.

Special projects: The Centre worked to develop procedures for two special areas of concern: spring breakup near the City of Fort McMurray and water management for the Lodge and Middle Creek watersheds in southeastern Alberta.

Hydrology Branch

The branch does hydrological engineering analyses. The branch determines annual and seasonal volumes of streamflow; the magnitude and frequency of floods and droughts; provides information and analyses for water management projects such as river basin planning, reservoir design and lake stabilization. The branch also assesses environmental changes which affect streamflow.

Major studies:

- Water allocation and supply studies for Sounding, Kennedy, Alkali and Iron creeks
- Assessing the hydrologic impact of proposed coal mines in the McLeod River Basin
- Evapotranspiration in Alberta from 1912 to 1982
- South Saskatchewan River basin natural flow update to 1982
- Analyses of floods for floodplain studies on Elbow River, Blackmud Creek and Sturgeon River at St. Albert
- History of floods in the Oldman River basin

The branch answered 293 requests from other divisions for hydrologic analyses and technical reviews of reports.

River Engineering Branch

The branch provides expertise in the area of river bank stabilization, flood risk mapping and river response to human interference.

Erosion protection and river training: Problem evaluation and preliminary design reports were prepared for 14 major projects. Significant projects were:

- Elbow River at Calgary flood mitigation study
- Winagami Canal
- Fort McMurray diking
- Cold Lake water supply studies
- Sand River Dam
- Pipeline from North Saskatchewan River

- Athabasca Pipeline - Amisk River
- Cold Lake outlet improvements
- Buffalo Bay/Horse Lakes studies

In all, 33 projects related to river erosion, stabilization and sedimentation were completed.

Flooding analysis: Thirty-two flooding assessments were done during the year and 71 subdivision applications were studied for flood risk for planning commissions and other agencies.

Flood-risk mapping: Flood risk maps are prepared to show flood prone areas for the purpose of future land development.

Major reports were completed for Cochrane, Waskasoo Creek, West Castle, Drumheller, Blackmud Creek and Okotoks.

Work was done on the following flood risk mapping projects:

- Bow River at Cochrane Stage II
- Oldman River at Fort MacLeod
- St. Albert Floodplain Study - revisions
- South Saskatchewan at Medicine Hat

Ice jam monitoring and control: Both breakup and freeze-up ice fronts were monitored at the Town of Peace River and at Fort McMurray. At Peace River, a predetermined river freeze-up level calculated to prevent higher groundwater problems, was set in by controlling flows from upstream dams. This work was done in cooperation with B.C. Hydro and Power Authority.

Ice monitoring was done on the North Saskatchewan River at Rocky Mountain House and on the Red Deer River downstream of the Dickson Dam.

Assessment for permits and licences: Twenty bridge/culvert crossings, 25 sand and gravel mining requests, 83 pipeline crossings and 17 others were reviewed during the year.

Survey Branch

The branch carries out land and water surveys for the department. The data are used in water management projects.

The branch has two sections, Land Survey and Water Survey. The branch also operates the Technical Services Division Records Centre which provides land survey and hydrometeorological data and related information to many different users.

Land Survey: This section does engineering and control surveys and arranges legal surveys, aerial photography and mapping services for the department.

In 1984-1985, there were 527 projects. Expenditures for contracted services were $1,107,041.

Some of the larger projects for which surveys were carried out were:

- Podruzny Drain
- Shoal Creek
- Parlby Creek/Spotted Lake
- Western Irrigation District main canal
- Lethbridge Northern Irrigation District main canal
- Oldman River Dam mapping control

New survey instruments and computer programs enabled the section to do more precise surveys. Surveys were carried out on the Paddle River and Dickson dams and on some concrete structures to ensure that these structures were performing to design specifications.

Water Survey: This section provides hydrometeorological data to the department. Data are gathered by field staff and by recording stations.

During 1984, the following data collection stations were operated by section staff:

Data	Number of Stations
Lake level	223
Recording streamflow or water level	70
Non-recording streamflow	69
Miscellaneous streamflow	77
Snow courses	126
Snow pillows	15
Non-recording precipitation	18
Recording precipitation	28

Two recording precipitation stations were installed and 24 stations were operated under the federal-provincial cost-sharing agreement for meteorological programs and stations. The province's cost was $12,199. Under another cost-sharing agreement, for water quantity surveys, 23 new stations were constructed at a cost of $139,200 and 497 stations were operated at a cost of $794,298.

The real-time hydrometeorological network was expanded during 1984-1985: six more satellite data collection platforms and one landline system were installed. The real-time network now has 61 stations. Data gathering continued in the Peace-Athabasca Delta and in the Spring Creek watershed research basin.

DESIGN AND CONSTRUCTION DIVISION

The division provides engineering and project management services for water supply and control projects. Projects include works for water supply, storage and distribution, drainage, flood and erosion control, lake level stabilization and rehabilitation of irrigation systems.

Division staff carry out field investigations and prepare detailed geotechnical, hydraulic and structural plans. They also manage projects, administer contracts, supervise construction and provide quality control. The division operates a materials testing laboratory and provides drafting services.

Geotechnical Branch

The branch is responsible for air-photo interpretation, geologic engineering and geotechnical investigations, assessments, designs, contract documents and cost estimates for division projects. The branch does geotechnical engineering, consulting and technical reviews for other divisions, departments and agencies.

Land Services Section: The section handles land-use agreements, appraisals and damage claims and maintains records of lands in which the department has an interest.

Geotechnical Design Section: The section produces geotechnical designs and contract drawings for departmental water-resources projects.

During the past year, the section completed 14 preliminary and 23 final geotechnical designs for a variety of projects such as rehabilitation of irrigation headworks systems, flood protection diking, erosion and lake control structures and earth dams for water-supply reservoirs.

Major geotechnical studies completed were the design of an earthfill dam for the Sand River, flood protection diking for the Town of Fort McMurray, the Buffalo Bay-Horse Lakes channelization and sediment pond diking and rehabilitation of the Western Irrigation District main irrigation headworks system.

The section also did 21 geotechnical reviews for other divisions. These varied from evaluating construction drawings for water supply reservoirs and mine-tailing disposal sites to assessing river-bank stability studies and subdivision development proposals.

Design work for the Keho Lake offstream storage reservoir was completed.

Geotechnical Services Section: The section is responsible for geologic engineering, site investigations, air-photo interpretation, material testing and managing geotechnical consulting contracts for branch projects. A detailed geologic report was provided for the Sand River Dam site.

Investigation Unit: The unit does site reconnaissance, drilling and field testing, installs instrumentation and monitors water resources projects.

Geotechnical investigations were completed for 30 projects during the reporting period.

Testing, instrument installation and monitoring were done on 12 projects for the geotechnical branch, other branches and for consultants doing studies for the department.

The unit maintains an inventory of gravel, sand and rock for projects throughout the province. Granular searches were completed for 10 projects.

Materials Testing Unit: This unit tests soil and concrete and does quality-control inspections during construction.

The laboratory completed work on 38 projects and provided quality control services on 12 projects.

Field laboratories were maintained at the Paddle River Dam and Lethbridge Northern Main Canal Rehabilitation project.

The laboratory automation project has been completed, with only minor software program development and modifications required.

Land Services Section: This section is responsible for: land-use agreements; land appraisals; processing claims; representing the department at Land Compensation Board hearings; land purchase and budgeting requirements; maintaining files on Alberta Environment Crown land and a library on Land Compensation Board decisions and court cases.

The Land Services Section conducts all of the appraisals for departmental land reclamation projects.

The section is reviewing procedures for handling and maintaining titles on Crown lands required for the irrigation headworks systems.

Design Branch

The branch is responsible for the hydraulic and structural designs of water-related projects. The branch prepares preliminary design reports and detailed project designs, construction contract documents and cost estimates. It manages some major projects such as rehabilitation and expansion of the Lethbridge Northern Main Headworks System and the Tyrrell-Rush Lakes Project.

Hydraulic and structural engineering services were provided to other divisions and departments.

The branch also provides drafting services for the department.

Paddle River Dam: The control building and instrumentation vault were redesigned, the control shaft and the spillway weir were modified to accommodate the change in dam elevation. The high-level intake structure was raised to accommodate higher earth berms.

Lethbridge Northern Main Headworks System: This project involves rehabilitation and expansion of about 80 kilometres of irrigation main canal and associated structures, improvements to the diversion headworks and raising of Keho Lake. It is scheduled for completion in 1989.

Construction work was completed on the diversion headworks and the major canal structures were replaced.

About 36 km of canal have been reconstructed. Eighty percent of the structures have been improved or replaced.

The construction work to enlarge Keho Lake started in the fall of 1984 with the awarding of a $3.65 million contract for east dikes and outlet structure replacement.

The Tyrrell-Rush Lakes Flood Management Project: This project is located 50 kilometres southeast of Lethbridge. It will control floods and drainage, regulate flow, control erosion, provide opportunities for water-based recreation and enhance fish, waterfowl and wildlife habitat.

Construction on the first phase was completed at a cost of approximately $1.1 million. Six kilometres of main drain were excavated and water supply channels with containment dikes and associated regulating structures were constructed.

Alberta Energy and Natural Resources and Ducks Unlimited contributed to the cost of construction.

Cold Lake-Beaver River Basin Water Management Plan: The design branch provided plans for structures being considered for the basin.

Preliminary plans were prepared for gated control structures on Burnt, Wolf, Ethel and Cold lakes, a storage reservoir on the Sand River and pipelines to import water from either the Athabasca or North Saskatchewan rivers.

Detailed plans and specifications were prepared for the Moose Lake outlet control structure built in 1984-85.

Drafting Pool

The pool has offices in Edmonton, Lethbridge, Peace River and Calgary.

Staff prepared detailed engineering drawings for construction of the Paddle River Dam and rehabilitation of the LNID Headworks System.

Other areas of activity in survey and general drafting were: topographic, hydrographic, mapping, construction of aerial photo mosaics, displays, graphs and charts and photographic services.

Construction Branch

The branch manages construction of water management projects and administers contracts. In 1984-85 the branch worked on 48 projects at an expenditure of $26 million.

Lethbridge Northern Main Headworks System Rehabilitation: During the year, the branch administered eight contracts for an expenditure of $14.5 million.

Sheerness Blowdown Canal and Bull pound Creek Lateral: Located southeast of the Town of Hanna in southern Alberta, the project involves the construction of a concrete lined irrigation canal leading from the cooling ponds of the Sheerness Power Generation Plant to the Carolside Reservoir and a lateral canal leading to Bullpound Creek. The main portion of the work was carried out under two contracts valued at $5.3 million.

Shoal Creek Flood Control: Located north of the Town of Barrhead, the project involves the clearing and widening of Shoal Creek to increase its flow capacity and to reduce flooding of agricultural lands. Work carried out during the fiscal year cost $525,000.

Office of the Director

The Director of Design and Construction is a member of the Irrigation Council, is chairman of the Irrigation Implementation Committee, the Paddle River Implementation Committee and the Forty Mile Coulee Independent Review Board. He also coordinates the LNID Headworks Rehabilitation Project on the Peigan Band reserve.

WATER RESOURCES ADMINISTRATION DIVISION

The division administers and enforces the Water Resources Act and Regulations, the Drainage Districts Act and funds local government water resources management projects.

The division has five branches: Surface Water Rights, Ground Water Rights, Dam Safety, Regional Services and Administrative Support.

Water Rights

The Surface Water Rights Branch and the Ground Water Rights Branch process applications under the Water Resources Act for licences to divert and use surface and groundwater.

Terms and conditions for licences are prepared after consulting with other agencies and members of the public. Files and plans are kept for all projects and the amount of water consumed is monitored through field inspections and water-use reports.

Surface Water Rights Branch

The number of outstanding interim licences was reduced from 1,522 to 1,249 and licensed projects were increased from 8,905 to 9,535 during the fiscal year. (Tables 10 and 11.)

The branch processed applications for energy projects such as Esso Resources Canada Limited at Cold Lake and the expansion of Shell Canada's Peace River project. Input was provided for the Cold Lake-Beaver River long-term water management study.

The results of a study on the west branch of the Michichi Creek in the Red Deer Basin were used to develop water administration criteria for licensing projects in the basin and the moratorium on issuing licenses in the basin was lifted in July, 1984.

Another moratorium on the main stems of the Little Bow and Mosquito creeks remained in effect, with the exception of small domestic and municipal projects, until the water supply study of the Little Bow River basin has been completed. Water rights staff contributed to the Little Bow River water management study.

Hydro-Electric Section: This section administers the Provincial Water Power Regulations under the Water Resources Act.

TransAlta Utilities Corporation installed a new computer-operated control system. The control center will be moved from Seebe to Calgary, which will enable remote operation of 13 hydroelectric plants.

An assessment of all hydropower facilities showed that the Bearspaw and Ghost developments and the Ghost River diversion works require modification to pass the maximum potential flood. A supplementary interim licence has been issued to modify the emergency spill capacity at the Bearspaw power development.

Hydropower facilities were inspected for maintenance and compliance with licences and regulations. During the past two years, all of the spill channels have been inspected. The Northern Saskatchewan, Bow and Kananaskis rivers were monitored in winter to observe ice and flow conditions.

Net hydroelectric generation for the past five years was:

YEAR	MEGAWATT-HOURS
1980	1,692,00
1981	2,027,000
1982	1,584,000
1983	1,473,000
1984	1,420,000

Ground Water Rights Branch

The number of exploration permits issued increased 47 percent and the number of applications for licences dropped 30 percent from 1983-84.

Field inspections increased from 151 to 205. (Tables 12 and 13.)

Regional Services Branch (Table 14)

Regional offices are in Peace River, Edmonton, Red Deer, Calgary and Lethbridge. Staff inspect water-related problems at the request of the public and local and provincial government departments, process permit and licence applications for non-consumptive water use and meet with local authorities, other agencies and the public.

Regional offices fund up to 75 percent of the cost of water management projects by local authorities. Eligible

Table 10
Surface Water Rights Progress Report

	Dom.	Mun.	Irgtn.	Agr.	Ind.	Water Power	Other	Storage	Natural State	Dvrsn.	Total 84/85	Total 83/84
Applications Received	0	15	99	183	18	2	14	35	0	120	486	505
Interim licences issued	0	12	77	197	20	0	11	36	0	124	477	547
Interim licences reissued	0	17	60	437	33	0	3	125	0	11	686	1,064
Licences issued	0	29	74	313	32	0	14	130	0	86	677	1,101
Licences reissued	0	17	26	320	26	0	4	18	0	2	413	373
Permits issued	0	33	0	0	347	0	147	0	0	0	527	502
Transfers	0	2	28	252	8	0	1	1	0	10	302	442
Cancellations	0	4	27	70	14	2	10	7	0	18	152	363

NOTE: Statutory purpose domestic was changed to agricultural on June 8, 1984 for all surface water rights projects.

Table 11
Surface Water Rights In Good Standing As of March 31, 1985

	Dom.	Mun.	Irgtn.	Agr.	Ind.	Water Power	Other	Storage	Natural State	Dvrsn.	Total 84/85	Total 83/84
Applications	0	14	206	38	7	0	26	49	0	140	480	459
Interim licences	0	19	364	122	22	1	50	82	0	589	1,249	1,523
Licences	0	262	1,946	5,906	314	8	62	481	0	556	9,535	8,905
Net Totals	0	295	2,516	6,066	343	9	138	612	0	1,285	11,264	10,887

NOTE: Statutory purpose domestic was changed to agricultural on June 8, 1984 for all surface water rights projects.

Table 12
Ground Water Rights Progress Report

	Dom.	Mun.	Irgtn.	Agr.	Ind.	Other	Dvrsn.	Storage	Total 84/85	Total 83/84	Total 82/83
Exploration permits issued	7	22	6	9	81	13	1	2	141	96	80
Applications received	14	45	0	33	73	16	2	7	190	272	153
Interim licences issued	13	60	0	29	140	12	2	6	262	203	137
Interim licences reissued	0	106	1	10	9	0	3	0	129	85	83
Licences issued	18	107	3	42	62	17	3	10	262	279	243
Licences reissued	0	20	0	5	3	0	0	0	28	8	0
Transfers	1	7	1	1	19	5	0	0	32	66	21
Cancellations	1	54	0	4	15	0	4	0	78	53	31

Table 13
Ground Water Rights In Good Standing As Of March 31, 1985

	Dom.	Mun.	Irgtn.	Agr.	Ind.	Other	Dvrsn.	Storage	Total 84/85	Total 83/84	Total 82/83
Applications	7	15	2	1	222	1	13	0	261	226	115
Interim licences	7	336	9	53	159	27	9	3	653	779	888
Licences	58	342	18	588	347	20	17	5	1,395	1,142	880
Net Totals	122	693	29	642	728	48	39	8	2,309	2,147	1,883

Table 14
Summary of Regional Activities

Regional Office	Inspections Remaining from Previous year	Inspection Requests	Inspections Completed	Inspections Remaining	Technical Reports Processed	Farm Surface Water Program Requests	FSWP Under Study	Cost Shared Projects Started and/or Completed
Peace River	74	324	351	46	297	142	73	25
Edmonton	73	431	434	70	434	31	31	38
Red Deer	61	186	191	47	191	18	40	19
Calgary	65	212	237	40	237	6	6	7
Lethbridge	43	718	620	125	620	13	3	9
Total 1984-85	316	1871	1833	328	1779	210	153	98
Total 1983-84	360	2287	2331	316	2298	154	128	82

projects are flow regulation, flood and erosion control, water conservation, lake stabilization and water management on agricultural land.

The offices provide services to landowners under the farm surface water management program, including survey and design, and support for the department's planning division in studies on major river basins.

Peace River Region: A summer rainy period led to many inspections, particularly in agricultural areas developed since 1975.

A total of 324 inspection requests were received, 351 inspections conducted and 297 technical reports processed.

A total of 16 licences, 174 permits and 17 letters of authority were issued.

Edmonton Regional Office: Edmonton region staff explained water management policies and programs to the public at many conferences, conventions and farm fairs during the year.

The region received 431 requests for field inspections on water management problems and 434 were completed. As of March 31, 1985, 70 outstanding requests required inspections.

The region received 61 new licence applications and 232 new permit applications; issued 91 licences, 240 permits and 48 letters of authority for temporary water diversions and cancelled eight licence applications. As of March 31, 1985, there were 14 outstanding permit applications.

A total of 42 projects were funded in the region. Four were funded totally by the province and the remainder were cost shared with local authorities under the water resources grant program.

There were 31 new requests under the farm surface water management program, 35 surveys and 24 designs were completed, construction work was done on nine projects and 25 licences were granted.

Red Deer Regional Office: The region received 186 inspection requests and 191 inspections were completed. At the end of the fiscal year, 47 requests were outstanding.

A total of 18 farm water management projects were begun, 27 were designed and five constructed. About 45 projects were being processed at the end of the year.

The office issued 112 permits, 47 letters of authority and 14 licences.

Under the water resources management grant program, 10 cost-shared projects were started and nine constructed.

Calgary Region: During the year, 19 projects eligible for cost sharing under the water resources grant program were reviewed. Construction began on four projects, three of which were nearly completed by the end of the year.

The region issued 82 permits and 39 licences for non-consumptive water projects. A total of 237 inspections were completed.

Under the farm surface water management program, six design requests were received and two designs prepared.

Lethbridge Region: As in the previous year, the most pressing concern was water shortages outside the irrigation districts. Shortages were caused by below-normal precipitation and a growing demand for additional water rights.

In response, the region increased the number of inspections in the Ross, Seven Persons and MacKay creek basins. Inspection requests for the year numbered 718; 620 inspections were done, leaving 125 outstanding at year end. There were 13 requests under the farm surface water management program and 11 reports made to applicants.

The region received 31 applications for permits and eight for non-consumptive use licences. Thirty-three permits, seven licences and 31 letters of authority were issued.

Seven cost-shared water management projects were finished during the year. At year end, 11 project proposals were being considered.

Irrigation districts in the region are submitting more proposals for projects, generally for repair of seriously eroded outlet drains.

Staff attended meetings with local authorities, landowners and other government agencies and sat on the Little Bow, Clear Lake and Tyrrell-Rush Lake technical committees.

Dam Safety Branch

The branch administers the Dam and Canal Safety Regulation. Applicants must apply for a licence and submit drawings and specifications to the Controller of Water Resources before constructing any water-retaining structure. The controller refers projects eight metres or more in height or 62,000 cubic metres or more in reservoir capacity to the branch.

During 1984, this branch reviewed 59 applications for licences. Twelve engineering reports evaluating the safety of major dams and canals were submitted.

Field inspections and instrumentation monitoring are a major part of the branch's work. In 1984, about 150 projects were inspected, including all major irrigation dams and the Dickson Dam.

Hypothetical breach inundation studies were carried out at five dams. These studies help in evaluating the hazard potential of dams and determine how often they are to be inspected and monitored. The City of Calgary was assisted with its emergency preparedness plans on the Glenmore Dam.

Forty-four reservoirs were examined by computer flood routing analysis to determine if structures might be overtopped.

Instrumentation to monitor the South McGregor Dam was installed and instrumentation at the major government-owned dams was plotted by computer.

Administrative Support Branch

The branch is responsible for administration, financial management and records control for the division. It provides administrative support to the nine drainage districts in Alberta and co-ordinates requests for flood ana-

lyses and damage appraisals of claims for Alberta Public Safety Services.

Financial Administration Section: This section is responsible for the preparation of the yearly division budget, monthly budget forecasts, purchasing, processing and control of purchase documents, accounts payable, personnel administration, payroll, contract administration, inventory control of fixed assets and controlled numbered forms. It also co-ordinates space, parking and office automation.

Records Administration Section: The section creates and handles records relating to management and licensing of water resources. These records are used mainly by water rights and regional services branches and by the Drainage Council. Records are stored on paper, microfilm and computer (Table 15).

The branch head was involved with Alberta Public Safety Services in evaluating 33 storms and floods. In addition, 14 floor-related incidents were investigated and 22 damage assistance claims were appraised at the request of Alberta Public Safety Services.

Table 15
Summary of Records Administration Activities

Year	Files Created	Reports Indexed	Files Retrieved	Plans Filmed	35mm Images Produced	16mm Images Produced	Micro Jackets Produced	Duplicate Produced
1982/83	550	294	36,987	3,274	7,600	259,997	9,095	72,570
1983/84	867	246	47,147	3,967	8,482	192,927	5,114	33,614
1984/85	709	365	44,800	4,495	11,134	148,711	4,168	26,631

Records Disposition

1982/83 - 79 cubic feet
1983/84 - 84 ½ cubic feet
1984/85 - 345 ½ cubic feet

PLANNING DIVISION

Responsibilities of the division include river basin planning, water resource project planning, benefit-cost analysis and environmental impact assessment of projects.

The division has three branches: Southern Region (Oldman, Bow and Red Deer River basins); Northern Region (North Saskatchewan, Athabasca and Peace River basins); and Planning Services. During the year, division staff supervised 126 agreements with consultants worth approximately $2.5 million.

River Basin Planning Studies

A river basin study examines a basin as a complete system. The resulting water management plan includes an inventory of water supplies and uses and recommends ways of resolving conflicts and meeting future needs. A plan is a rational basis for developing projects and is updated to meet new conditions.

Peace River basin: Study design work began for the Peace River basin planning program. Major studies were on water use and a fisheries overview. Many studies were carried out for more specific projects.

Athabasca River basin: During 1984-85 detailed water quality data were collected along the mainstem of the river.

Cold Lake-Beaver River basin: Technical studies completed in 1984-85 will be used to evaluate three long-term water management alternatives for the basin: a dam on the Sand River, an industrial water supply pipeline from the North Saskatchewan or Athabasca basins and use of local supply, including Cold Lake. Conceptual designs and cost estimates were prepared for each alternative, supply reliability studies and effects on recreation, fisheries and wildlife assessed.

North Saskatchewan River basin: Documents were prepared which contained water quality information on the basin. They will be used in developing a model to predict the effects future development will have on water quality in the basin. About 6,000 complaints on agricultural flooding and drainage were under review. The results will be used to decide how to manage water for agriculture. Groundwater was analyzed to get an overview of supply, hydrology, geology and hydrochemistry in the basin.

Battle River basin study - phase III: The main planning concern in the basin is the need for a reliable water supply. Large increases in demand, primarily industrial, have been predicted. It was decided that a large on-stream reservoir near Gwynne would not be feasible because of high costs and very small low flow increases.

Phase III studies concentrated on the potential for augmenting Battle River flows by diverting water from the North Saskatchewan River near Devon, by pipeline, into Coal Lake. Studies were done of water balance, water use and demands, water quality, in-stream flows for fish and recreation, economic analysis and project design.

South Saskatchewan River basin: Analysis and evaluation of water use management was completed. A summary report and 68 planning program documents were made public. After public information sessions in September and October, the Alberta Water Resources Commission held 15 days of hearings in 10 cities and towns in southern Alberta. Two hundred and twenty-four submissions were made to the commission which will make recommendations to the government on water management in the basin.

Regional Water Resources Management Studies

Some planning studies are done to help manage water resources in regions or sub-basins.

Sturgeon Lake water quality study: A study was commissioned to find out the effect of different land uses on nutrient levels in Sturgeon Lake. The study is part of a larger study by the Department of Energy and Natural Resources.

Iroquois Creek: Work continued on an inventory of flooding and drainage problems on agricultural land, surveys of channel capacities and an analysis of land use changes in the sub-basin.

Redwater River hydrotechnical study: This study, began after many flooding complaints, will assess the hydraulic capacity of the river and its ability to accept more inflow from the tributaries as a result of agricultural drainage.

Whitford Lake basin water management study: A draft report on water management strategy recommends flood control measures consisting of fixed-crest weirs or chan-

nel controls at the outlet of nine sloughs and a clean-out of the channels between sloughs. This project will prevent inundation of agricultural lands under most conditions.

Seven alternative water management strategies for Whitford/Rush Lakes were considered. Four will be evaluated by the technical and advisory groups.

McLeod River basin: The purpose of this study is to develop a water management plan that meets the needs of all users and takes into account future development of forestry and coal mining. Data was collected on surface water hydrology, water quality and sedimentation. The division investigated possible effects of planned coal mining on groundwater near the Hamlet of Robb. Work was started on a water balance model.

Willow Creek basin: Meetings were held with public representatives to select several water storage sites for detailed engineering feasibility studies. Water storage in the basin is required for agricultural and municipal use. Negotiations began for access to land for investigations.

Little Bow River basin: Work continued on the inventory for the basin water management plan. The basin experienced significant drought related problems in 1984. A summary report on Phase I activities was prepared.

Special Areas water management: The division investigated how to improve the efficiency of some small projects. A study was done to find out what facilities and equipment would be required to ensure stockwater supplies during the drought.

Sounding Creek: Sounding Creek water management study phase II was completed. The study outlined several alternatives for water management measures. These involve replacing inefficient older projects and investigations are underway to select an alternative.

Alkali Creek basin study: An overview of water supply and demand is being prepared. Future demands will be estimated and opportunities for water storage assessed.

Kneehills Creek: The Kneehills Creek basin study was started. Hydrology and water quality studies were carried out in 1984-85.

River Basin Project Studies

Fort McMurray floodplain management study: The planning team representing Alberta Environment and the City of Fort McMurray studied alternatives for dikes to protect the lower townsite from floods. Preliminary designs were prepared for the dike alignments including earthworks, erosion protection, storm-water management, landscaping and structures. This will lead to selection of a preferred alignment.

Buffalo Bay-Horse Lakes management program: The purpose of this program is to develop a water and land management plan that will improve fisheries, wildlife and agricultural production while maintaining the necessary flow through the Buffalo Bay-Horse Lakes delta. During the 1984-85 fiscal year, detailed cost estimates of the major management alternatives were done. Hydraulic studies of the East and West Prairie rivers estimated the total area of land which may be flooded on the average once every 10 years. Using these studies, an economic analysis of the management alternatives began in 1985.

Minnie Lake/Village of Glendon water supply: A study which will address the stabilization of Minnie Lake and the water supply requirements of the Village of Glendon was begun. The division will assess the water balance of the lake, its relationship with groundwater, recreation and fisheries requirements and the water supply needed by the village. The study will be completed in March, 1986.

Figure Eight Lake: An overview study on water quality problems and possible ways of dealing with them was carried out for this popular recreational lake. Algae control and maintenance of fish populations were the main problems.

Cardinal Lake: Ways of improving the boat launch were examined instead of trying to manipulate fluctuating water levels.

Vermilion River, Morecambe Structure: An operational strategy for Morecambe structure was developed. Analysis indicated that the Chain of Vermilion Lakes near Two Hills can be used to store water during summer floods and so protect land against most floods. The effects on wildlife are being studied.

Pigeon Lake level management: Alternatives for regulating lake levels were re-evaluated to include analysis of both fixed and variable vested contract structures.

Spotted Lake-Parlby Creek: The Minister of Environment announced that drainage works along Parlby Creek would proceed. A committee was formed to develop a management plan for Spotted Lake that will benefit agriculture, fisheries and waterfowl. The various options are being evaluated.

Drumheller flood control: The Dickson Dam is lowering flood levels on the Red Deer River so floodplain mapping throughout the Drumheller Valley was revised and alternatives for reducing flood damage assessed. The alternatives are being presented to the public at open houses.

Elbow River flood study: Arrangements were made with the City of Calgary to do a floodplain management study and develop a plan for a flood hazard area. The study, to be started in 1985, will be funded by Alberta Environment and managed by the Planning Division and the City of Calgary.

Site Development Program

The program is administered by the Operation and Maintenance Division. Program objectives are to restore construction sites to near-natural conditions; improve the appearance of provincial water management projects and provide some public facilities.

A site development study was completed for Cadotte Lake. A detailed site plan was completed for the day-use area on the Paddle River reservoir. A reclamation plan was completed for the Forty Mile Coulee reconstruction project.

Other related studies:

The County of Vulcan and the Oldman Regional Planning Commission were helped to prepare a shoreland management plan for McGregor, Travers and Little Bow reservoirs.

Environmental Mitigation Studies

Oldman River dam and reservoir: An environmental mitigation/opportunities action plan was started.

The purpose of the plan is to reduce harmful effects on the environment and identify opportunities for recreation and other uses. The plan will address reservoir operation, ecological, land use and social issues, cultural resources (archeological sites) and agricultural, recreational and tourism opportunities. Detailed inventories of environmental resources in the area were compiled.

Others: An environmental mitigation report was done for the Crawling Valley reservoir. Mitigation studies for Iosegun Lake (cultural resources and fishway), Moose Lake (fishway), and Badger Lake (cultural resources) were completed.

Data Base And Methodology Development

Economic evaluation methodology: A model was developed to assess the benefits to hunters of a change in waterfowl breeding habitat caused by water management project.

Water use data: Development of the water use information system progressed with implementation of the industrial and enhanced oil recovery water use subsystems. External system specifications were completed for the agriculture, municipal and power generation water use sub-systems.

Environmental assessment: The hydraulic and fish passage performance of several new fishways was monitored. The division was involved in designing fishways for outlet control structures on Moose and Iosegun lakes.

The division began monitoring the environmental effects of the Dickson Dam and the effects on vegetation caused by varied water levels at the Paddle River Dam. A study of the effects of water temperature on fish in the Forestburg reservoir was completed. The information is being used to develop criteria for a licence to use the reservoir for cooling purposes.

A study of weed growth in the Battle River was begun.

A computerized system to evaluate instream flow, using hydrologic data, was tested and developed. This model was designed for use in basin planning and feasibility studies and to prepare graphics and comparative analysis of output from advanced instream flow models.

Field work was completed for the in-stream flow study on the Highwood River. The PHABSIM model, (an instream flow assessment model) was installed to analyze the data collected.

River recreation classification system: A study was begun to prepare a system for classifying rivers for recreation. Classification would be based on biophysical characteristics of river valleys and the flow required for activities such as boating.

Other Planning Services

Drought emergency water supply program: In September, 1984, the Minister announced the drought emergency water supply program designed to help rural landowners and communities in the areas of southern Alberta affected by drought to replenish their water supplies. The program is co-ordinated by the Calgary office of the Planning Division. Some 1,142 rural landowners were helped to test for groundwater. Eighteen communities applied for emergency assistance. Many farmers applied for emergency dugout pumping, particularly in the Bow Island, Foremost, Claresholm, Pincher Creek and Wrentham areas.

Agricultural land base study: Alberta Environment participated in a major study with Alberta Agriculture, Energy and Natural Resources, Transportation and Municipal Affairs to find ways of expanding the province's agricultural land base.

The department is interested mainly in the implications of a rising demand for irrigation water and more drainage of land. An inventory of drainable lands, funded by the Alberta Water Resources Commission, is managed by an interdepartmental steering committee.

During 1984-85, Planning Division staff helped Alberta Agriculture prepare reports on options for expanding agricultural land. The division was represented on sub-committees which examined costs, benefits and effects of the options.

Eastern Slopes - integrated management plan: The Oldman basin group supported the Department of Energy and Natural Resources in preparing plans for the Castle River and Livingstone Porcupine Hills.

Battle-Lodge-Middle Creek apportionment study: The Planning Division headed a committee to review Alberta's commitment to its apportionment agreement with Saskatchewan. A summary report and recommendations on procedures for the 1985 spring runoff were prepared.

North Saskatchewan River winter ice flooding study: The winter floodplain monitoring committee monitored the effects of winter operation of the Bighorn dam on downstream ice flooding. The superintendent of the National Historical Park at Rocky Mountain House joined the committee.

Headworks operational assessment: A series of computerized model runs were made to analyze 1985 water supply conditions for the Waterton-St. Mary and Carseland-Bow irrigation headworks. Operational guidelines were developed.

Environment Canada: Division staff helped Environment Canada with two projects. The first project looked at the reaction of lake users to deteriorating water quality in Coal and Driedmeat lakes. The other projects updated a water-based recreation survey done for the Prairie Provinces Water Board of the Saskatchewan-Nelson Basin. Planning Division distributed questionnaires to provincial government and municipal agencies.

Red Deer Regional Planning Commission: Staff helped the commission review and revise the Sylvan Lake management plan.

Mackenzie River basin committee: Staff sat on federal-provincial and interprovincial committees which are working toward an agreement for managing water in the Mackenzie River basin. Study programs were begun and data on water issues which affect Alberta, the Northwest Territories and Saskatchewan was assembled.

OPERATION AND MAINTENANCE DIVISION

The division operates and maintains provincially owned water-control structures throughout the province.

The division has three branches and two groups: Irrigation Headworks, Projects Management, Equipment and Materials, Special Projects and Administrative Services.

Irrigation Headworks Branch

The branch operates and maintains irrigation headworks systems serving eight irrigation districts in southern Alberta: St. Mary River (SMRID), Lethbridge Northern (LNID), Bow River, Western, Mountain View, Leavitt, Aetna and Magrath. Two other irrigation districts, Raymond and Taber, are served by the SMRID. Some 336,000 hectares of land are irrigated by water diverted from the following five provincially owned irrigation headworks systems: Waterton-St. Mary, Carseland-Bow, Western, Lethbridge Northern and Mountain View-Aetna.

The Irrigation Headworks Branch will eventually take over the operation and maintenance of the headworks systems of the Eastern (EID), United (UID) and Ross Creek (RCID) irrigation districts. In the meantime, the province funds rehabilitation of the RCID and UID works. Rehabilitation of the Bassano Dam in the EID was begun under terms of a 1973 federal-provincial agreement.

An agreement finalized in April, 1981, between the province and the Peigan Band Council has allowed continued access through the Peigan Reserve to the LNID provincial headworks. The headworks system within the reserve is now fully functional.

Rehabilitation work on the LNID included construction of three timber bridges on the rehabilitated canal and repair of the access road to the diversion structure. Because of heavy water demand and inadequate storage in Keho Lake, the irrigation district was forced to shut off irrigation water to the users for a total of 33 days in 1984.

The telemetry and remote-control system on the LNID head gates was fully operational. The local automatic and remote alarm systems were installed during the reconstruction of the Monarch structure.

On the Waterton-St. Mary headworks system, two timber bridges were replaced, the Pinepound syphon was repaired and canal slope stabilization work was carried out. Structural repairs were completed on one St. Mary Dam irrigation tunnel gate and on stem guides in the gate wells of Ridge Reservoir Dam. Rock from behind the St. Mary spillway wall was removed by hydro-flushing.

On the Mountain View-Aetna System, 700 metres of polyethylene seepage cut-off curtain was installed, a new trash rack was added to the Lee Creek syphon and the floor slabs of the pipe drop outlet structures were replaced. Two canal under drains were replaced and riprap protection was provided to canal banks. Additional right-of-way along the canal was purchased.

Rehabilitation work on the Carseland-Bow system which serves the Bow River Irrigation District included placement of bank protection material, road and structure maintenance and replacement of a bridge.

A second safety boom was installed in the Bow River downstream of the Carseland weir. Fences and warning signs were installed along canal structures and at the weir portage.

Maintenance work included the installation of corrosion protection to the Travers Dam, low level outflow and erosion protection for the Little Bow outlet structure.

Investigations and surveys were done on the Western Irrigation District headworks system to assemble information for future canal improvements. The safety campaign for the Calgary weir warning boaters to stay away from the weir was successful.

Significant progress was recorded in entering data in the branch's computer plan retrieval system. Approximately 10,000 as constructed plans have been coded and 5,000 entered into the data base used to retrieve information for maintenance purposes.

The enhanced hydrological computer program has proved to be a beneficial tool to users in the effective management of water.

The land administration section of the branch continued to transfer to the Bow River irrigation district required canal right-of-way pursuant to the 1975 provincial/district agreement. The section prepared right-of-way land schedules for the headworks systems to facilitate the transfer of surface rights from Energy and Natural Resources (ENR) to Environment. The land schedules for the Waterton-St. Mary headworks system have been submitted to ENR. The section also dealt with numerous land use and disposition applications affecting the provincial headworks right-of-way.

A total of 1,621,000 cubic decametres (1,315,000 acre feet) of water was delivered to the irrigation districts in 1984, apportioned as follows:

Water Delivered to Irrigation Districts During 1984

	Cubic Decametres	Acre Feet
St. Mary River (including TID and RID)	801,000 dam^3	650,000 acre feet
Bow River	397,000 dam^3	322,000 acre feet
Western Lethbridge Northern	200,000 dam^3	162,000 acre feet
Mountain View-Aetna - Leavitt	176,000 dam^3	143,000 acre feet
Magrath	30,000 dam^3	24,000 acre feet
Total	17,000 dam^3	14,000 acre feet
	1,621,000	1,315,000

Projects Management Branch

The branch operates and maintains provincially owned water management projects in Alberta.

This involves operating gate systems on dams and lake stabilization structures, operating water supply pumps and pumphouses, undertaking channel cleaning and log-jam removal on major streams, rivers and drainage ditches and installing warning signs and safety devices.

Grande Prairie Section: Maintenance was performed on the Spring Creek Road project. This project serves as a network of road linkages to several hydrologic research projects. Gabion installation, repair of bridge rails, road grading and gravelling and channel clean-out were required.

Many improvement district drainage ditches were also maintained. Major work was completed on Bouchard, Ksituan, Letersky, Highland Park Line 5 and Jack Creek Drainage.

Peace River Section: Maintenance involved the grading and gravelling of many kilometres of access roads, removal of silt from the canal bed between McLennan and Kimiwan Lake and repair and installation of safety booms, safety fences and warning signs. Operations included monitoring of water levels and adjustment of gate settings on the Heart River reservoir-Winagami Lake system.

Cost shared maintenance was performed on Swan Delta Flood Relief Channel, Talbot, Kushner and Marie Reine and many other I.D., M.D. and Local Authority projects.

Central Section: Operations were required on 14 provincial projects. They included pumping into Lac Ste. Cyr through the St. Paul Pipeline, release of water from Bigelow, Severn and Vermilion Reservoirs and adjustment of top log settings at Pigeon Lake, Buck Lake and Barrhead Water Supply.

Logs and debris from the log boom and railway trestle were removed from the Paddle River to keep the river flowing freely. Backhoes were used to improve the outlet channels of Flat and Twin lakes. This maintenance will help eliminate the back-up and flooding of water around the shoreline of these lakes.

The Central Section helped the Dickson Dam staff repair control gates on the fish pond, install gravel on roads and construct boat ramps, picnic tables, toilets and parking lots for public use.

Dickson Dam: Staff completed their second year of operation and maintenance.

The reservoir hit its lowest storage level of 933.1 metres (4.9 metres below full supply level) in May, 1984. The reservoir was dropped to this level to enable an inspection of the upstream dam berm after the first filling last year.

Spring runoff in late June and early July brought the storage volume back to full supply level by the end of July.

Staff worked on site development projects at several potential recreation areas around the reservoir. Five boat launch pads and parking and day-use areas were completed.

Southern Section: Fourteen works were operated, including the Chain Lakes Reservoir, MacKay and McAlpine Reservoirs, Bullshead Reservoir, the Little Bow Canal and the Squaw Coulee Diversion.

Maintenance was required on the Squaw Coulee and Little Bow Canal projects to repair erosion. Repair work included sloping and installing gravel and raising and leveling canal banks.

The Projects Management Branch is responsible for two lake stabilization projects. Gull Lake, 12.9 km west of Lacombe, was stabilized at the target elevation. Pumping was not required during 1984-85 but will be carried out if lake levels drop.

The St. Paul pumphouse on the North Saskatchewan River has been pumping water into Lac Ste. Cyr since 1978. The lake was raised to within 0.15 metres of the target stabilization level as of March 31, 1985. Pumping will continue until the level is reached.

Equipment and Materials Branch

The branch provides support to Water Resources Management Services. The branch has several functions:

Equipment Section: The Equipment Section provides equipment to Water Resources Management Services.

For much of the year the section helped pump water to alleviate the drought. Water was pumped to four village reservoirs and four pumping stations were set up to fill farmers' dugouts.

This section also assisted the division with landscaping at the Dickson Dam, placing pit run and crushed gravel for erosion protection at Milo Park, hauling and splitting firewood and building boat ramps and picnic tables under the Alberta Environment Employment Program,reclaiming a gravel pit and placing rocks for canal bank protection.

Materials Section: This section has warehouse and yard storage facilities in Edmonton, Lethbridge, Grande Prairie and Peace River. It manages a materials inventory of about $0.3 million. The section is responsible for ordering, stockkeeping, warehousing, materials sales service and equipment leasing for Water Resources Management Services and receiving and storage services for all areas of the department.

Revolving Fund Accounts Section: The accounts section monitors and processes payments to vendors, sends out invoices to users for items sold or rented, monitors revenue and expenses, reports to management on financial status and prepares and monitors the Revolving Fund Budget.

Central Vehicle Services: The vehicle co-ordinator administers the vehicle pool for the department. About 500 vehicles were issued during the year.

Special Projects Group

Special Projects implements and manages the following projects:

Northwest Alberta Erosion Control Program: The objective of this program is to rehabilitate drainage ditches and flood control channels in northwestern Alberta.

Improvements were made to 30 km of channel including, the installation of grade control structures, upgrading the capacity of road and farm crossings and reclamation and seeding of channel rights-of-way. Brush was removed from eight km of channel and riprap stockpiled in preparation for 1985-86 rehabilitation works.

Fourteen private contractors carried out reconstruction activities under this program.

Special areas: The Deadfish Water Supply System was operated to supply irrigation water to 405 hectares (1,000 acres) of land.

The Blowdown Canal and Bullpound Lateral components of the Sheerness Water Supply System were completed in August, 1984. This enabled a limited amount of water to be pumped into the Carolside Reservoir for release down Berry Creek for winter stock watering. Diversions were also made into the Bullpound Creek.

The systems will be required to supply irrigation water to approximately 1,620 hectares (4,000 acres) during 1985-86.

Site development program: This program involves the reclamation and revegetation of areas disturbed by construction of water-management projects. Day-use facilities are provided for recreation.

During 1984-85, upgrading was done at Lake McGregor, Dickson Dam, Figure Eight Lake, Jensen Reservoir and Buck Lake.

The Alberta Environmental Centre produced native forb seeds, and trial plots were established at various sites. Native trees and shrubs were produced to revegetate borrow pits and cut slopes of the Paddle River Dam.

Sites are maintained with the help of the private sector. Maintenance is carried out by local residents at each site and local firms do horticultural maintenance in three regions.

Twenty-five sites have been established on 18 lakes and reservoirs within Alberta.

Office of the Director

The director is a member of a negotiating team to settle land related issues with the Blackfoot Band. He is also the department's representative on the government's committee on native land claims and the native career opportunities program committee.

Administrative Services Group

The group administers division activities related to personnel, finance, staff development and budget. The group also provided financial control for a number of revenue producing agreements involving the use of provincial water management projects.

ENVIRONMENTAL EVALUATION SERVICES

K.R. Smith
Assistant Deputy Minister

J.M. King
Director
Land Reclamation Division

F.J. Schulte
Director
Environmental Assessment Division

Environmental Evaluation Services regulates resource development by requiring environmental impact assessments for major developments, assessing development, exploration and reclamation applications, dealing with regional planning commissions and the Energy Resources Conservation Board and administering restricted development areas.

In 1984, the Regional Land Use and Restricted Land Use branches were transferred from the Land Reclamation Division to the Environmental Assessment Division.

The office of the Chairman of the Development and Reclamation Review Committee was designated to process and coordinate the review of coal mining applications.

During the reporting period, landowners near Calgary were told that the five-mile wide restricted development area around that city would be reduced to the half-mile transportation/utility corridor and the environmentally sensitive areas near the Bow and Elbow rivers. A private consulting group completed a survey and reassessment of the transportation and utility corridors around Calgary and Edmonton.

The Heritage Savings Trust Fund continued to fund research and reclamation of abandoned and derelict industrial lands.

LAND RECLAMATION DIVISION

The division administers The Land Surface Conservation and Reclamation Act and regulations.

The division reviews applications and impact assessments of proposed developments which disturb land and grants conditional approvals which set land reclamation standards.

Staff also carry out inspections, reclamation projects and special studies to enforce and improve reclamation and environmental planning.

This division administers the Surface Reclamation Fund which comprises security deposits paid by the developers to ensure satisfactory reclamation of disturbed land.

Land Conservation and Reclamation Council

The Council's reclamation officers monitor surface disturbances to make sure they are satisfactorily reclaimed. Officers may issue orders for reclamation of disturbed lands and certify that reclamation is satisfactory.

There are 20 provincial and 163 municipal government reclamation officers. During the 1984-85 fiscal year, officers issued 90 reclamation orders, a decrease from 114 a year earlier. Some 1,468 reclamation certificates, an increase of 410 over the previous year, were issued. This authorized the reclamation of abandoned well sites, access roads, pipelines, battery sites, coal and sand and gravel operations.

Fifty-four reclamation certificates were issued on coal exploration approvals, an increase of six from the previous year. Three reclamation certificates were issued for oil-sands development approvals as well as three for coal development projects and sand and gravel projects.

Crown Mineral Disposition Review Committee

The committee reviewed applications relating to coal, oil sands, quartz and oil and gas. Oil and gas leases and licences constituted most of the workload. As a result of the review, a total area of 2,114,393 hectares was offered for sale by open tender, an increase of 1,380,276 hectares over 1983.

Exploration Review Committee

This committee reviews coal exploration applications referred by the Land Conservation and Reclamation Council.

During 1984, the number of programs reviewed and recommended for approval, was 17, which represented a decrease from the previous year's total of 42.

Development and Reclamation Review Committee

This committee does detailed technical reviews of major operations and recommends operational terms and conditions for development and reclamation approvals issued by the Minister.

During 1984-85, the committee dealt with a number of applications. Approvals were issued to Canadian Occidental Petroleum Ltd., Manatokan Area In-Situ Scheme; Esso Resources Canada Ltd., Cold Lake Production Project, Phases 3 and 4; Husky Oil Operations Ltd., Tucker Lake Experimental Scheme; and Shell Canada Resources Ltd., Peace River Expansion Project.

Amendments were issued to 13 approvals.

Reclamation Branch

The branch reclaims abandoned or derelict lands and studies material-handling techniques for land disturbed by certain operations.

The branch administers the Land Reclamation Program, funded by the Alberta Heritage Savings Trust Fund.

Funding was provided to reclaim 73 sites to some type of beneficial use. Of these, 61 projects were on municipal lands and 12 on Crown land (see Table 16). The branch's major projects continue to be reclamation of abandoned garbage dumps and sewage lagoons on municipally owned land.

Regulated Operations Branch

The branch prepares operational terms and conditions for development and reclamation approvals of major pipelines and gravel operations. The branch also reviews

electric transmission line applications and makes recommendations for ministerial approval.

Since the Sand, Gravel, Clay and Marl Surface Operations Regulation was enacted in 1982, a major function of the branch has been to notify pit operators of the regulation and help them to obtain the required approvals.

Linear Projects Section: This section is responsible for the department's review and approval process for high voltage electric transmission lines and oil and gas pipelines as referred by the ERCB. Section staff represented the Crown or assisted the Attorney General's Department in representing the Crown, at 13 ERCB pipeline and transmission line hearings.

The section reviewed ERCB decision reports and evidence presented at hearings with regard to matters of environmental protection. Recommendations for ministerial approval and development and reclamation approval were prepared.

The section is completing a number of pipeline studies which should improve understanding and cooperation between the government and the oil and gas industry on environmental issues.

Transmission Lines: The section reviewed 26 applications for electric transmission lines, a decrease of three from the previous reporting period.

Pipelines: The section reviewed 548 applications for pipeline projects in the province, an increase of 16 from the previous year. Of these, 33 applications required development and reclamation approval under the Regulated Oil and Gas Pipeline Surface Operation Regulations. This represented an increase of 10 from the previous year.

Sand and Gravel Section: The Sand, Gravel, Clay and Marl Surface Operations Regulation A.R. 228/82 was enacted in 1982. Under this regulation, all large sand, gravel and clay operations on patented land in the province require a development and reclamation approval.

An inventory and notification program to record all operations and to notify the landowners and holders of a gravel lease of the regulation requirements was continued during the year. The program will carry on until all operations on patent land have been recorded and all active operations have received development and reclamation approval.

In 1984, the program focussed on 10 municipalities which contained 424 gravel operations, of which 194 required development and reclamation approval. To date, 1,052 pit operations have been recorded in 27 municipalities with 452 requiring approval. The remaining operations were either inactive or were of a minor size which did not require approval.

During the reporting period 88 applications for development and reclamation approval were reviewed. Eighty-five approvals were issued to private developers, counties, Alberta Transportation and Alberta Environment operations. The sand and gravel referral system reviewed 85 proposed highway projects submitted by Alberta Transportation.

Table 16
Reclamation Projects 1984-85

Disturbance	Municipal	Public	Green Area	Total
Access roads			4	4
Garbage dumps	20	3		23
Sewage lagoons	17			17
Sand and gravel pits	11	2		13
Siesmic lines and coal exploration trails			2	2
Water storage sites	6			6
Derelict areas	1			1
Industrial sites	1			1
Abandoned coal mines	3		1	4
Mine hazards	2			2
Abandoned well sites				0
Total	61	5	7	73

ENVIRONMENTAL ASSESSMENT DIVISION

The division develops, maintains and coordinates the department's environmental impact assessment (EIA) system, related public participation programs and provides services in remote sensing technology.

EIAs are required for most major resource developments proposed in the province, such as new oil-sands mining projects, sour gas processing plants, coal mining projects, power plants, refineries and petrochemical facilities, pipelines, transmission lines, recreational developments and water resource projects.

The division also administers the restricted development area (RDA) regulations which designate transportation utility corridors and areas requiring special environmental protection.

Ministerial consent is required before most land-use changes in restricted development areas. The RDA regulations are also the basis for implementing the Calgary and Edmonton transportation/utility corridors.

Environmental Impact Assessment Review Branch

The branch evaluates proposals to determine if environmental impact assessment reports are needed, decides the scope and content of EIA documentation and coordinates interdepartmental reviews.

Thirty-six new projects were referred to this branch in the last year. They included six preliminary disclosures and 30 energy-related applications. Two new EIAs were requested, one decision is pending, and the remainder did not require EIAs. Ten project reviews were carried over from the previous fiscal year. A total of 39 project reviews were completed.

Table 17

New project referrals to the EIA Branch (April 1, 1984 to March 31, 1985):

Type of Project	No. of Referrals
Coal	2
Quarries/gravel pits	3
Industrial	5
Recreation	1
Oil sands	25
Total	36

Major environmental reviews were initiated or completed for the Esso Resources Phases 3, 4, 5 and 6 projects, the Murphy Oil and Dome Lindbergh in-situ oil sands plants, the Pincher Creek fertilizer plant and the Shell Peace River expansion project. The branch coordinated the participation of Crown agencies at the ERCB public hearings for the Pincher Creek and Shell projects.

The branch determined the scope and established review procedures for the Chem Security environmental protection plan for the Swan Hills special waste treatment site.

In addition, the branch coordinated Alberta agencies' review of the environmental impact statement required by Saskatchewan Environment for the Husky upgrader project at Lloydminster.

The EIA Review Branch is working with the federal government to develop joint information requirements for the proposed Slave River hydro project. It is also developing principles to review projects that have environmental implications for both provincial and federal jurisdictions.

The branch is helping review regulatory approval systems for coal and oil sands developments.

Restricted Land Use Branch

The Department of the Environment Act (Section 16) provides for the designation of restricted development areas (RDAs) in the province. Thirteen such designations have been made since 1974. The two main reasons for RDA designations are the need for special environmental management in certain areas and for protection of transportation/utility corridor lands. Administration of the 13 RDAs is the responsibility of the Restricted Land Use Branch.

Subdivision and development applications and most proposed land-use changes are reviewed to determine whether they conform to the regulations set up for a specific RDA. Ministerial approval is required before there can be any change in land use.

During the past year, 221 requests for ministerial approval were received. Of these, 162 were approved, two were refused and 19 did not require consent. The remainder were either awaiting decision, withdrawn or regarded as information. In terms of applications processed, the

more active RDAs in the province, were those in Calgary and Edmonton (see Table 18).

The Restricted Land Use Branch is involved in studies related to RDA programs. During 1984-85, work continued on evaluating the environmental sensitivity of the Calgary, Edmonton-Devon and Edmonton-Fort Saskatchewan RDAs. Work was also done to reassess right-of-way requirements for the Calgary and Edmonton transportation/utility corridors.

Community Affairs Branch

The branch is responsible for fostering the public's involvement in environmental impact assessments and water management projects.

Environmental impact assessment: Individuals and community groups were given information and advice on environmental issues and the regulatory process. Branch staff advised proponents on the requirements for public involvement programs and monitored them to ensure that they conformed to the intent of the EIA guidelines.

The branch assisted with public involvement in a total of 17 projects which comprised: 11 industrial developments, five oil-sands projects and one major transmission-line.

Branch staff also helped individuals and community groups planning to intervene at Energy Resources Conservation Board hearings where an EIA was part of the proponent's application. Assistance was given to a number of advisory committees and special interest groups, such as the Community Advisory Committee of Cold Lake, the Genesee Power Project Advisory Committee, the Keephills Steering Committee, the Quirk Creek Community Gas Plant Committee, Preserve Agricultural Land, the Twin Butte Soils and Water Evaluation Task Force and the *Twin Butte Times* Contributor's Committee.

Water management projects: Staff assisted public involvement in many departmental water resource projects, including the South Saskatchewan River Basin Study, the Beaver River-Cold Lake Water Management Study, Wabamun Lake Level Advisory Committee, Whitford Lake Water Management Study, Paddle River Dam Implementation Committee, the Oldman River Dam, the Little Bow River Basin Study, the Willow Creek Basin Study, Forty-Mile Coulee Reservoir Development and the Lesser Slave Lake Regulation Project.

The branch participated in a workshop on environmental enforcement and monitoring, an environmental education conference and the acid deposition research program.

Alberta Remote Sensing Center

The services and facilities of the centre are available to Albertans free of charge. The center uses resource satellite (Landsat) and aircraft data for surveying and managing the province's natural resources and in exploration and development for northern Canada.

Users can view Landsat images in the center's Landsat microfiche facility, image library and prime scene index. The center also has computer access to the federal government's Canada Center for Remote Sensing Technical Information Service.

Specialized equipment, including a digital image analysis system and staff assistance are available for analyzing and applying Landsat and aircraft multiband imagery.

The center funded projects by the private sector and schools to demonstrate the application and cost-effectiveness of remotely sensed data.

Briefings, lectures, workshops and displays were held throughout the province. The thirteenth Alberta Remote Sensing Course drew participants from across Canada.

The center produced specially enhanced satellite imagery of grazing lands for distribution to Alberta range managers.

Regional Land Use Branch

The branch evaluates proposals for major land uses such as subdivisions and industrial sites. The branch's objective is to protect high quality agricultural, recreational and high water yield lands and water bodies from inappropriate usage.

Subdivision referral system: Applications for changes in land use and subdivisions are referred to the branch by the 10 regional planning commissions, the planning services division of Alberta Municipal Affairs, the cities of Airdrie, Leduc, St. Albert, Fort McMurray and Lethbridge, the counties of Grande Prairie, Parkland and Strathcona and the Municipal District of Rockyview.

The branch comments on behalf of the department regarding compliance with the Land Conservation Guidelines, susceptibility to flooding, bank and slope stability, risk of erosion, surface drainage, availability of a domestic groundwater supply, potential air and water pollution and suitability of the soil for sewage disposal.

Branch staff assessed major residential and cottage resort subdivisions near water. Much time was spent with developers reviewing applications for cottages and rural developments and pointing out the risks of sewage contamination, erosion due to vegetation removal, overcrowding and over use of the lakes.

The number of applications processed decreased from 1,404 in the previous year to 1,253, reflecting the economic condition and an oversupply of country residential lots (Table 19).

Staff represented the department at Alberta Planning Board hearings on subdivision application appeals by developers.

They also reviewed development permit applications for rural municipalities, including the counties of Lacombe, Lac Ste. Anne, Leduc, Lethbridge, Red Deer, Strathcona and Wheatland and the municipal districts of Clearwater, Foothills and Rockyview.

Lake shoreland regulations: The branch continues to administer the Regulated Lake Shoreland Development Operation regulation.

Of the 15 lakes originally affected, only Lake Isle remains subject to the regulation.

Three subdivision and development applications were affected by the regulation, one proposal was not subject to the regulation and one was approved.

Development of land for industrial or recreational uses and unsubdivided land for residential development will not be allowed until a lake management plan and land-use bylaw have been adopted.

Lac Ste. Anne was removed from the schedule of regulated lakes on September 5, 1984, as all requirements of the regulations had been met.

Annexations: Staff reviewed and inspected 19 applications for annexation of rural lands to urban municipalities as a result of referrals from the Local Authorities Board.

Table 18

Ministerial Consents Summary (April 1, 1984 to March 31, 1985)

RDA	Total Requests	Consent	Refusal	No Consent Required	P/W/C*	Total 1974
Blue Ridge	0	0	0	0	0	6
Calgary	74	57	0	1	16	1,038
Capital City Park	14	7	1	0	6	41
Edmonton	63	44	1	2	16	433
Edmonton/Devon	28	22	0	2	4	148
Edmonton/Fort Saskatchewan	14	9	0	0	5	101
Fish Creek	2	1	0	1	0	13
Fort McMurray	4	4	0	0	0	48
Lethbridge	11	10	0	0	1	71
Pinehurst Lake	0	0	0	0	0	2
Sherwood Park West	10	8	0	0	2	72
Strathcona	1	0	0	1	0	6
Turtle Mountain	0	0	0	0	0	10
	221	162	2	7	50	1,989

***pending, withdrawn or closed**

Table 19

Subdivision Referral Activities

Planning Authority	No. of Applications 1984	1983	Percent Change
Regional Planning Commissions:			
Battle River	82	120	32
Calgary	68	174	61
Edmonton Metropolitan	64	95	33
Mackenzie	46	79	42
Oldman River	90	117	23
Palliser	136	136	0
Peace River		4	100
South Peace	45	52	13
Red Deer	140	163	14
Southeast Alberta	28	38	26
Yellowhead	82	106	
Planning Services Division (Municipal Affairs)	188	167	11
Cities:			
Airdrie	0	1	100
Leduc	1		
Lethbridge	8	2	75
Fort McMurray	2	9	77
St. Albert	5	8	38
Counties:			
Grande Prairie No. 1	57	67	15
Parkland No. 31	29	33	12
Strathcona No. 20	42	12	71
Municipal District of Rocky View No. 44	140	21	85
Total	1253	1404	11

FINANCIAL STATEMENTS

ALBERTA ENVIRONMENT

SUMMARY OF EXPENDITURES FOR THE 1984-85 FISCAL YEAR

Reference Number			Program/Sub-Program Element	Sub-Program Element	Program Total
01	00	00	Department Support Services		
01	00	01	Minister's Office	$ 167,584	
01	00	02	Deputy Minister's Office	363,323	
01	00	03	Finance & Office Services	2,005,217	
01	00	04	Systems & Computing	1,416,738	
01	00	05	Communications	365,434	
01	00	06	Library	355,860	
01	00	07	Personnel & Organization Development	500,085	
			Total Department Support Services		$5,174,241
02	00	00	Pollution Prevention and Control		
02	01	00	Program Support	643,180	
02	02	00	Air Quality Management	2,671,709	
02	03	00	Water Quality Management	2,214,712	
02	04	00	Municipal Water and Sewage Management	1,936,972	
02	05	00	Earth Contamination	2,653,987	
02	06	00	Waste Management	3,800,435	
02	07	00	Chemical and Pesticide Management	2,076,582	
			Total Pollution Prevention and Control		15,997,577
03	00	00	Land Conservation		
03	01	00	Program Support	107,035	
03	02	00	Land Conservation and Reclamation	4,786,970	
03	03	00	Environmental Assessment	1,082,207	
			Total Land Conservation		5,976,212
04	00	00	Water Resources Management Services		
04	01	00	Program Support	105,876	
04	02	00	Surface Water Development and Control	15,824,110	
04	03	00	Water Resources Administration	9,884,269	
04	04	00	Operation and Maintenance	8,137,813	
04	05	00	Data Collection Inventory	6,669,559	
04	06	00	Water Resources Planning and Co-ordination	5,740,165	
04	07	00	Groundwater Development	2,994,026	
			Total Water Resources Management Services		49,355,818
05	00	00	Environmental Research		
05	01	00	Environmental Research Co-ordination	1,435,308	
05	02	00	Alberta Oil Sands Environmental Research	1,486,188	
			Total Environmental Research		2,921,496
06	00	00	Interdepartmental Environment Research and Services		
06	01	00	Program Support	2,280,401	
06	02	00	Plant Sciences	1,677,096	
06	03	00	Chemistry	2,642,825	
06	04	00	Animal Sciences	2,250,204	
06	05	00	Environmental Technology	2,005,671	
			Total Interdepartmental Environment Research and Services		10,856,197
07	00	00	Special Waste Management		3,885,000
			TOTAL ACTUAL EXPENDITURES FOR THE YEAR		$94,166,541

ALBERTA ENVIRONMENT

SUMMARY OF EXPENDITURES AND REVENUES

FOR THE YEAR ENDED MARCH 31, 1985

ALBERTA ENVIRONMENT PROGRAM EXPENDITURES		
Departmental Support Services	$ 5,174,241	
Pollution Prevention and Control	15,997,577	
Land Conservation	5,976,212	
Water Resources Management	49,355,818	
Environmental Research	2,921,496	
Interdepartmental Environment Research and Services	10,856,197	
Special Waste Management	3,885,000	
TOTAL		$ 94,166,541
MANPOWER EXPENDITURES ON BEHALF OF ALBERTA ENVIRONMENT		
Priority Employment Program (P.E.P.)	242,465	
Employment Skills Project (E.S.P.)	55,154	
Special Placement Work Experience (S.P.W.E.)	3,561	
Summer Temporary Employment Program (S.T.E.P.)	464,756	
Alberta Environment Employment Program (A.E.E.P.)	211,237	
TOTAL		977,173
HERITAGE SAVINGS TRUST FUND - ENVIRONMENTAL PROGRAMS		
Irrigation Headworks Improvement	40,779,438	
Land Reclamation	2,684,190	
Paddle River Basin Development	4,110,893	
TOTAL		47,574,521
TOTAL ENVIRONMENTAL EXPENDITURES		$142,718,235
REVENUE COLLECTED BY DEPARTMENT		
Water Diversion Permits	2,528	
Water Well Drilling Permits	8,655	
Water Power Rentals	260,289	
Department Miscellaneous	696,864	
Rural Water Development Program	2,805	
Previous Year Refunds	50,661	
Industrial Water Diversion	53,025	
Water Resources Revolving Fund	2,520,518	
Mildred Lake	48,245	
McLennan-Girouxville Canal	2,372	
North West Alberta Cost Sharing Program	13,343	
Groundwater Data	8,300	
Land Leases	3,558	
Sheerness Deadfish Creek	2,804	
Forfeits - Plans and Specifications	2,875	
TOTAL REVENUE COLLECTED		$ 3,676,842

WATER RESOURCES REVOLVING FUND

FINANCIAL STATEMENTS

MARCH 31, 1985

Auditor's Report

Balance Sheet

Statement of Operations and Surplus (Deficit)

Notes to the Financial Statements

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

AUDITOR'S REPORT

To the Minister of Environment

I have examined the balance sheet of the Water Resources Revolving Fund as at March 31, 1985 and the statement of operations and surplus (deficit) for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Fund as at March 31, 1985 and the results of its operations for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

F.C.A.
Auditor General

Edmonton, Alberta
September 13, 1985

WATER RESOURCES REVOLVING FUND

BALANCE SHEET

AS AT MARCH 31, 1985

	1985	1984
ASSETS		
Current:		
Accounts receivable	$ 388,710	$ 428,404
Insurance claim receivable	95,062	-
Materials	296,752	355,378
Prepaid expenses	1,606	3,314
	782,130	787,096
Other:		
Rental equipment (Note 3)	2,827,423	3,060,925
Maintenance and office equipment (Note 4)	81,505	113,100
	$3,691,058	$3,961,121
LIABILITIES AND SURPLUS		
Current:		
Accounts payable	$ 297,197	$ 292,826
Advances from the General Revenue Fund	3,355,211	3,621,712
	3,652,408	3,914,538
Surplus	38,650	46,583
	$3,691,058	$3,961,121

The accompanying notes are part of these financial statements.

WATER RESOURCES REVOLVING FUND

STATEMENT OF OPERATIONS AND SURPLUS (DEFICIT)

FOR THE YEAR ENDED MARCH 31, 1985

	1985	1984
Revenue:		
Material and gas sales	$ 339,631	$ 277,067
Less: Cost of goods sold	323,286	261,866
Gross profit on sales	16,345	15,201
Equipment rental	2,123,704	2,309,962
	2,140,049	2,325,163
Expenses:		
Operation of equipment	1,222,662	1,232,946
Depreciation	510,753	501,020
Equipment rental	348,173	400,579
Repair and maintenance operations	40,328	32,081
Administration	34,332	26,119
	2,156,248	2,192,745
Operating surplus (deficit) for the year	(16,199)	132,418
Gain on disposal of equipment	8,266	42,772
Surplus (deficit) for the year	(7,933)	175,190
Surplus (deficit) at beginning of year	46,583	(128,607)
Surplus at end of year	$ 38,650	$ 46,583

WATER RESOURCES REVOLVING FUND

NOTES TO THE FINANCIAL STATEMENTS

MARCH 31, 1985

Note 1 Authority

The Water Resources Revolving Fund operates under the authority of the Water Resources Act, Chapter W-5, Revised Statutes of Alberta 1980.

Note 2 Significant Accounting Policies and Reporting Practices

(i) Depreciation is calculated on a straight-line basis over the estimated useful life of each type of equipment.

(ii) Major overhauls, significantly extending the life of equipment, are depreciated on a straight-line basis over the remaining useful life of the equipment.

(iii) Materials are valued at weighted average cost.

(iv) All leases with respect to the rental and maintenance of equipment, as lessee or lessor, can be cancelled at the end of any fiscal year and are therefore accounted for as operating leases.

(v) Certain administration and other costs are provided at no charge by the Province of Alberta and accordingly are not reflected in these financial statements. These costs include salaries and wages, certain overheads and the rental charges for the Edmonton, Lethbridge, Grande Prairie and Peace River warehouses.

(vi) Changes in Financial Position

A statement of changes in financial position is not provided as disclosure in these financial statements is considered to be adequate.

Note 3 Rental Equipment

	1985	1984
Cost	$5,444,460	$5,233,860
Accumulated depreciation	2,617,037	2,172,935
	$2,827,423	$3,060,925

Note 4 Maintenance and Office Equipment

	1985	1984
Cost	$195,160	$195,753
Accumulated depreciation	113,655	82,653
	$ 81,505	$113,100

Note 5 Comparative Figures

The 1984 figures have been restated where necessary to conform to 1985 presentation.

Note 6 Approval of Financial Statements

These financial statements were approved by management.

SURFACE RECLAMATION FUND

FINANCIAL STATEMENT

MARCH 31, 1985

Auditor's Report

Balance Sheet

Notes to the Financial Statement

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

AUDITOR'S REPORT

To the Members of the Land Conservation
and Reclamation Council

I have examined the balance sheet of the Surface Reclamation Fund as at March 31, 1985. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, this financial statement presents fairly the financial position of the Fund as at March 31, 1985 in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

F.C.A.
Auditor General

Edmonton, Alberta
October 23, 1985

SURFACE RECLAMATION FUND

BALANCE SHEET

AS AT MARCH 31, 1985

	1985	1984
ASSETS		
Cash (Note 2)	$2,493,104	$4,373,203
Securities in trust with the Province of Alberta	142,550	116,250
	$2,635,654	$4,489,453
LIABILITIES		
Trust Fund (Note 3)	$2,635,654	$4,489,453

The accompanying notes are part of this financial statement.

SURFACE RECLAMATION FUND

NOTES TO THE FINANCIAL STATEMENT

MARCH 31, 1985

Note 1 Authority

The Surface Reclamation Fund operates under the authority of the Land Surface Conservation and Reclamation Act, Chapter L-3, Revised Statutes of Alberta 1980. The purpose of the Fund is to hold security deposits received pursuant to the Act as an assurance that satisfactory land surface reclamation will be performed. Since all interest received by the Fund is allocated and subsequently paid to depositors, no surplus or deficit arises on the Fund's operations.

Note 2 Cash

Cash consist of deposits in the Consolidated Cash Investment Trust Fund of the Province of Alberta.

Note 3 Trust Fund

Transactions in the Trust Fund are summarized as follows:

	Cash Deposits	Securities	1985 Total	1984 Total
Balance at beginning of year	$4,373,203	$116,250	$4,489,453	$4,799,977
Security deposits received	439,525	76,300	515,825	620,670
Interest received	391,780	-	391,780	434,074
	5,204,508	192,550	5,397,058	5,854,721
Security deposits returned	2,711,404	50,000	2,761,404	1,365,268
Balance at end of year	$2,493,104	$142,550	$2,635,654	$4,489,453

Note 4 Bank Guarantees

In addition to the deposits in trust and securities shown on the balance sheet, the Fund held bank guarantees as at March 31, 1985 in the amount of $41,754,988 (1984 $30,902,445).

Note 5 Approval of Financial Statement

This financial statement was approved by management.